datalon

TRAX

TRUE MULTIMEDIA

3

Table of Contents

1 Introduction 1
Welcome 1
Computer Requirements 2
Software Installation 3
Upgrading from a Previous TRAX Version 4

2 System Overview 6
Dataton Control Units 9
Software Overview 12
System Modes 16

3 TRAX Windows 20
Device Window 23
Device Status Windows 28
Timeline Window 29
Task Window 51
Device Support 63

4 Menus and Commands 72
File Menu 73
Edit Menu 77
Object Menu 89
Device Menu 94
Cue Menu 95
Symbol Menu 96
Window Menu 102
New Timeline 102
Timeline Settings 103
List View 106
Time Scale 107
Track Name 107
Preferences 108
Security Options 113

5 Devices 115
General Device Characteristics 115
Slide Projector 123
Switch 129
Tape 133
Audio Disc 141
Video Disc 143
Still Store 147
Lamp 148
Level 149
Panel 150
Text 151
Time 152
Serial 154
IR 155

6 Panel Design 156
Panel Status Window 156
Button 163
Indicator 168
Slider 170
Bar Graph 171
Display 172
Line, Frame and Oval 174
Static Text 174
Pictures 175
Testing a Panel 177

7 Cues 178
General Cue Characteristics 179
Locate 186
Set/Fade 190
Dissolve 194
Zoom 198
Wipe 200
Flash 202
Snap 204
Trigger 206
Gang 210
Control 212
Note 218

8 Presentations 219
Canned Presentations 220
Speaker Support 226
Live Events 232
Interactive Presentations 234
General Media Integration 235
Staging Shows 238
Automatic Start 240

9 Interactivity 241
Inputs 242
Touch Panels 246
Virtual Devices 252
Timing 257
Branching 261

10 Creating Serial Device Drivers 264
Before You Begin 268
Editing an Existing Driver 278
Creating a Driver 280
Driver Settings 282
Entering the Commands 292
Command Strings 298
Downloading the Driver 311
Using Your Driver 312

11 SMARTPAX 316
Front Panel 317
Rear Panel 324
SMARTLINKS 326
Power Supply 340
Rack Adaptors 341

12 TOUCHLINK 342

13 AIRLINK 346
Transmitter 346
Receiver 351

14 PAX 355
Front Panel 356
Rear Panel 363
Projector Adaptors 366
Switch Functions 367
Power Supply 368

15 TRANSPAX+ 369
Tape Signals 373
Front Panel 379
Rear Panel 388
Tape Adaptors 392
Power Supply 393

A. News in TRAX 3 394
Overview 394
Windows 396
Menus 399
Devices 400
Cues 404
Preferences 405
Using Shows Made on TRAX 2 405

B. Glossary 409

Index 423

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1 INTRODUCTION

Welcome

Welcome to DATATON TRAX® the heart of the Dataton media integration and control system. TRAX transforms your Apple Macintosh™, or compatible computer, into a powerful tool for creating and running shows incorporating virtually any combination of presentation media. The control system expands and enhances your Mac's capabilities, while maintaining the precise timing and synchronization that is the hallmark of all good presentations.

About This Manual

This manual is organized into four main sections. The first section consists of this chapter and the following one entitled "System Overview." These two chapters give you a quick introduction to TRAX as well as the rest of the Dataton control system.

The subsequent five chapters make up the reference section of this manual. They go through all the different aspects of TRAX, such as windows, menus, commands, devices and cues. This is where to look for detailed information related to a particular part of TRAX.

The following two chapters, entitled "Presentation Methods" and "Interactivity," give you an overview of the kinds of presentations you can create, as well as some tips and hints related to each kind of presentation.

The remaining chapters cover the hardware parts of the control system in detail. Look here for information on SMARTPAX, PAX and TRANSPAX+ control units and their interface cables, as well as TOUCHLINK – the interactive touch panel – and the AIRLINK wireless remote control.

Computer Requirements

You can run TRAX on any Apple Macintosh, Power Macintosh, PowerBook, or compatible running Mac OS version 7.0 or later. Mac OS version 7.5.3 or later is recommended, and is required for some functions.

You must have at least one megabyte of free RAM memory, after loading your System software and extensions. Substantially more memory may be required to use graphics and sounds with TOUCHLINK. You need at least 5 megabyte of free hard-disk space in order to install TRAX and its accompanying files.

A free serial port, such as the modem or printer port, is needed to connect TRAX to the rest of the Dataton system. For large systems, TRAX can use two serial ports simultaneously to double the number of control units and devices that can be connected. This feature can't be used with computer models that have a combined printer/modem port or no external modem port (e.g., some PowerBook models).

A color monitor is recommended, but not required. A color monitor is particularly useful when making TOUCHLINK touch panel designs.

Software Installation

Before installing the software, please take a few moments to fill out the registration card and return it to Dataton either by fax or by mail. Registering your copy of TRAX gives you the following benefits:

- A Dataton T-shirt.
- Free support by fax or e-mail.
- Notification when new versions of TRAX become available.
- Substantially reduced prices on upgrades, or even free upgrades to fix bugs or other minor details.
- Free subscription to *News&Views*, Dataton's user magazine, with news from the field of multimedia around the world.

Installing TRAX on Your Hard Disk

To install TRAX on your computer, insert the TRAX 3 diskette, as shown to the left, in your computer and follow these steps:

- Double-click the "Dataton TRAX Installer" icon.
- Navigate to your hard-disk, or any folder where you want to install TRAX.
- Click the Extract button.

This will install TRAX and its accompanying files in a folder at the location you specified. No other files will be installed or modified.

Follow the same procedure to install the "TOUCHLINK Graphics Sampler".

▼ **IMPORTANT:** Do not install the "Dataton TRAX Runtime" diskette on your computer.

Personalizing TRAX

The first time you use TRAX after installing it, you will be asked to enter your name and serial number. The serial number can be found on the original diskette as well as on the registration card.

All shows saved using your personalized copy of TRAX will carry your name, which will be displayed when the show is opened. Furthermore, you can add your own copyright message and logo (or other picture), as well as an optional password, to the show using the Preferences command on the Window menu (see "Preferences" on page 108).

Upgrading from a Previous TRAX Version

If you're upgrading from a previous version of TRAX, you should follow the same procedure as described on page 3. Keep this new version of TRAX in its own folder so you can tell them apart.

- **HINT:** To tell the old version from the new one – in case you get them mixed up – select the application's icon in the Finder and choose "Get Info" from the File menu.

Due to the extensive changes in TRAX version 3 compared to earlier versions, you should keep the old version on your computer as well. Although TRAX version 3 can read files created with older versions of TRAX, not all functions are fully upward compatible.

Example Show

Shows saved from TRAX version 3 have a "3" in their icon, and the right version of TRAX will automatically be launched when you double-click a show file.

See "News in TRAX 3" on page 394 for further details if you're upgrading from an older version.

Installing TRAX Runtime on a Computer

Included in the TRAX package is a "Dataton TRAX Runtime" diskette, and a license to install the runtime version on any number of computers. This allows you to run a show from a computer at a client's site, or other installation, without leaving the full TRAX package behind. The TRAX runtime version does everything the full TRAX package does except saving onto disk. If desired, you can also block other functions – such as the ability to stop the show – using a password (see "Password" on page 113).

To install the Runtime version on a computer, insert the "Dataton TRAX Runtime" diskette, and follow the same procedure as outlined above under "Installing TRAX".

▼ **IMPORTANT:** Do not install the "Dataton TRAX Runtime" on a computer that already has the full version of TRAX installed. If you do, the Mac OS Finder may choose to launch the runtime version instead of the full version when you double-click a show file.

2 SYSTEM OVERVIEW

The illustration to the right shows how a system can be hooked up, based on TRAX and some Dataton control units. The type and number of control units required depends on the size of the system and which kinds of devices you need to control.

Dataton TRAX Software

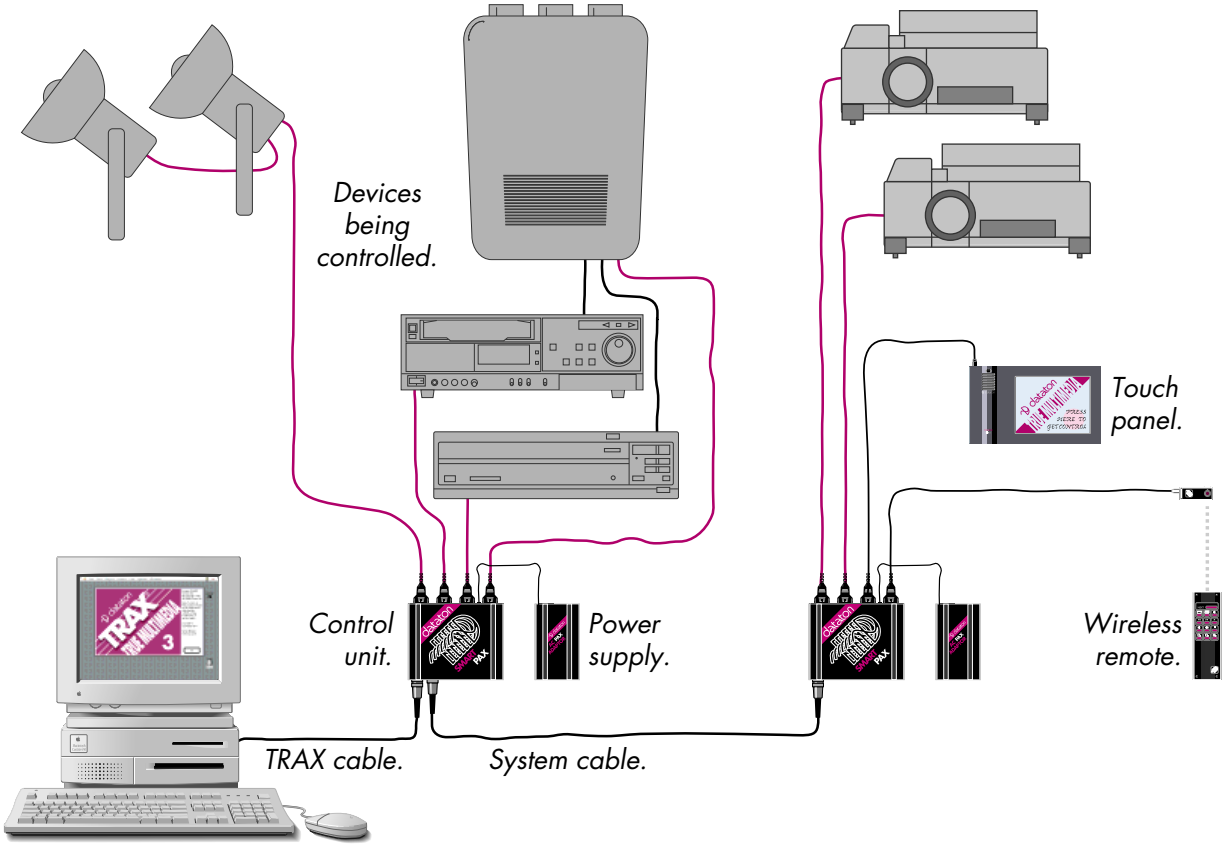
With TRAX you can create and edit presentations of virtually any size, incorporating all kinds of presentation media. TRAX is based on a device, task and timeline metaphor. The devices being used in the presentation – such as the lamps, video projector, slide projectors, video players, touch panel, etc. – are represented in TRAX by icons. Cues are placed along timelines or in the Task window, and determine what should happen, when, and to which devices. See "Software Overview" on page 12 for more details.

TRAX Cable

The TRAX package includes one grey TRAX cable used to connect the serial port of the computer to the first control unit in the chain. The TRAX cable can be extended up to 20 meters using Dataton system cable (see page 8).

You can double the capacity of your system by using two TRAX cables – one for each serial port on your computer. You will also need additional TRAX cables when making installations using the TRAX Runtime.

Example System Hookup



System Cables

Dataton system cables are used to link one control unit to the next. These black cables are available in 0.3, 1, 2 and 5 meter lengths, as well as in a kit that allows you to make custom lengths of up to 100 meters.

The maximum cable length between two control units is 100 meters. The system cable bus is optically isolated in each control unit to avoid ground loops and interference.

Presentation Devices

The presentation devices – such as tape decks, disc players, lighting equipment, projectors, etc. – are connected to the back of the control units using the appropriate cables.

Please refer to the list in the "Device Support" window in TRAX for a full rundown of supported devices. Support for new devices is added continuously as new device drivers are developed. Please contact your Dataton dealer if you need to control a device not shown on the list.

TRAX also contains a built-in database with information on each supported device. Select a device in the "Device Support" window and click the "Info" button to view its database information (see "Getting Information on Devices" on page 65).

Dataton Control Units

The control units act as “intelligent hubs”, or junction boxes, allowing up to four presentation devices to be controlled from each unit. In addition to simply distributing the information from TRAX to the devices, the control units also monitor the devices continuously in order to make sure that they do what they have been told. The control units also provide information back to TRAX, such as user input or feedback from presentation devices.

SMARTPAX

SMARTPAX is the most flexible Dataton control unit. It can be adapted to handle virtually any kind of device, ranging from simple relay switches to sophisticated video effects devices. Its flexibility comes partly from the library of downloadable software device drivers built into TRAX, and partly from the SMARTLINK interface cables. While some smartlinks are just simple cables, others come with their own built-in intelligence and interface circuits. Each SMARTPAX controls up to four devices or sub-systems. Some devices provide input functions, which can be used with TRAX interactive capabilities. See Chapter 11 “SMARTPAX” for more details.

TOUCHLINK

TOUCHLINK is an interactive, graphically oriented, user interface for TRAX. It can be used in all kinds of installations requiring direct user interaction, such as in a museum, visitor center, exhibition or corporate boardroom.

TOUCHLINK combines a color LCD display with a touch-sensitive surface, sampled audio playback and a motion sensor. It connects to a SMARTPAX port, just like any other presentation device. It holds up to 99 pages of pictures, text, graphics, buttons, sliders, and a variety of other interactive elements. See Chapter 12 “TOUCHLINK” for more details on the hardware.

You use TRAX both to design the TOUCHLINK user interface and to test it. TRAX can simulate all functions of one or many TOUCHLINK units while also managing all other aspects of your presentation. This means that you don’t even need to own a TOUCHLINK in order to try it out. Please refer to Chapter 6 “Panel Design” for details on how to use TOUCHLINK.

AIRLINK Remote Control

AIRLINK consists of the AIRLINK TRANSMITTER (product number 3448) and AIRLINK RECEIVER (product number 3449). It allows you to control the presentation from a distance, for speaker support or interactive applications. See Chapter 13 “AIRLINK” for more details.

TRANSPAX+

TRANSPAX+ acts as an interface to most professional open-reel and cassette audio recorders. TRANSPAX+ handles tape transport control as well as recording and playback of a variety of timecode and cue track standards. See "TRANSPAX+" on page 369 for more details.

PAX

PAX controls most electromechanical slide projectors, including both professional circular tray projectors and straight tray projectors. PAX supports features such as controllable shutter, electronic home sensing and fast random access of slides. A range of projector adaptors is available for various projector models. PAX can also be used for simple on/off switch functions, as each of the four ports can control either a slide projector or two relay functions. See "PAX" on page 355 for more details.

Software Overview

The illustration on the right shows a typical TRAX screen. The following pages give you a quick overview of the various windows and menus, with references to the sections of this manual that fully describe these elements.

Menu Bar

The menus in the menu bar along the top of the computer screen provide access to most commands in TRAX. See Chapter 4 "Menus and Commands" for details on each menu.

File. Commands for saving and opening presentations.

Edit. Standard editing commands, such as Cut and Paste, as found in most Macintosh applications.

Object. Additional editing commands more specific to TRAX.

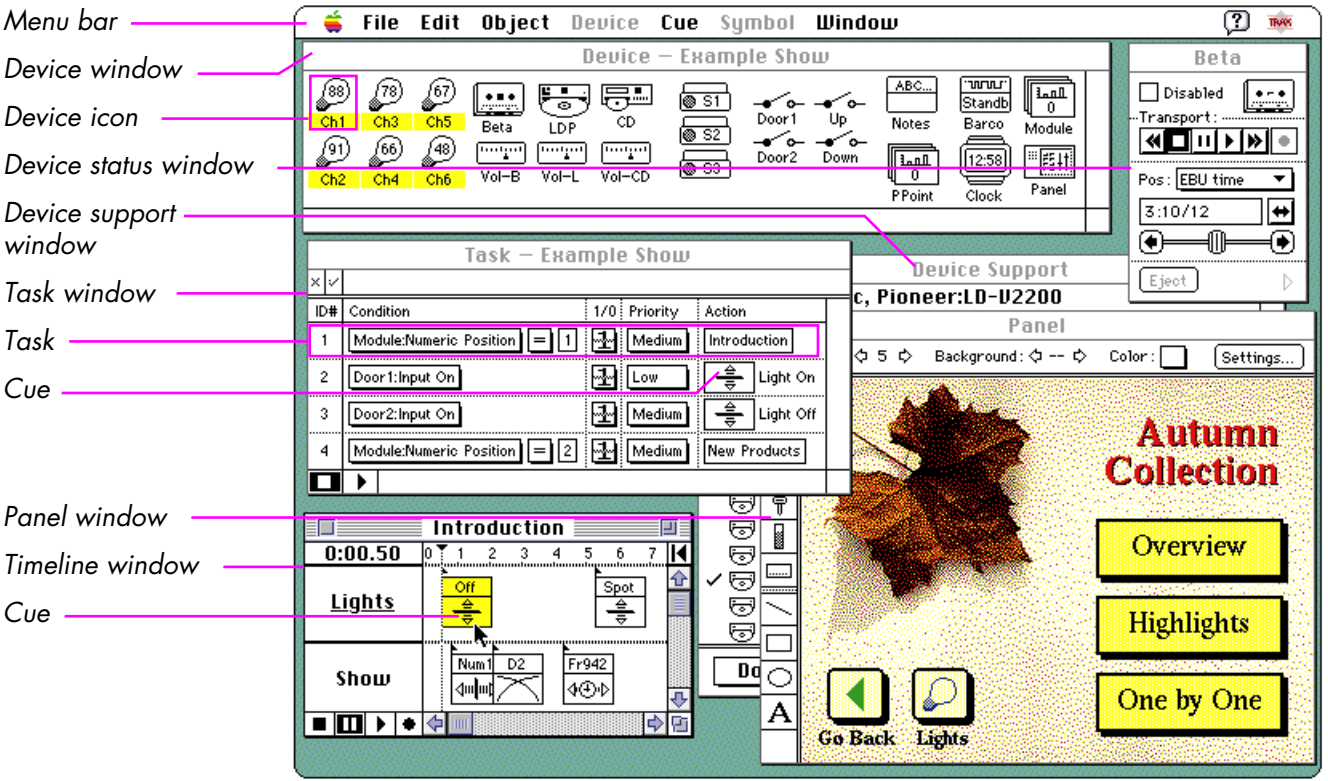
Device. Adds new devices to the Device window. You must select the Device window in order to use this menu.

Cue. Add new cues to a timeline or the Task window.

Symbol. Inserts symbols into expressions used as starting conditions for tasks in the Task window.

Window. Opens or selects another window, or changes its appearance.

The Apple menu on the far left as well as the Application menu on the far right contain system-wide functions according to your computer's configuration.


Menu bar
Device window
Device icon
Device status window
Device support window
Task window
Task
Cue
Panel window
Timeline window
Cue
File Edit Object Device Cue Symbol Window
Device – Example Show
Ch1 Ch3 Ch5 Ch2 Ch4 Ch6
Beta LDP CD Vol-B Vol-L Vol-CD
S1 S2 S3
Door1 Door2 Up Down
Notes Barco Module PPoint Clock Panel
Beta
Disabled
Transport:
Pos: EBU time
3:10/12
Eject
Task – Example Show
ID# Condition I/O Priority Action
1 Module:Numeric Position = 1 Medium Introduction
2 Door1:Input On Low Light On
3 Door2:Input On Medium Light Off
4 Module:Numeric Position = 2 Medium New Products
Device Support
c, Pioneer:LD-V2200
Panel
Background: Color: Settings...
Introduction
0:00.50
Lights
Off
Spot
Show
Num1 D2
Fr942
Autumn Collection
Overview
Highlights
One by One
Go Back
Lights

Device Window

The icons in the window titled "Device – Example Show" on the previous page represent the various devices used to run the presentation. Use the Device menu to add devices to this window (see "Device Menu" on page 94).

The icons show basic status information, such as whether a tape deck is playing or not. For a more detailed view of the status of the devices, you can open individual device status windows, as described below. All devices are described in detail in Chapter 5.

Device Status

The window titled "Beta" is a status window associated with the device of the same name in the Device window. Each device has a status window, which can be used to view or change the device's status. See Chapter 5 for a full description of the status window for each kind of device.

Panel Window

Interactive elements can be added to a presentation by using a touch panel, such as the one shown in the lower right corner of the screen. The tools along the left hand side of the Panel window allow you to add elements and functionality to the panel, as well as testing the panel. See Chapter 6 "Panel Design" for information on how to design a touch panel user interface.

Task Window

The window titled "Task – Example Show" on page 13 holds all the tasks that make up the presentation. Tasks can be short, consisting of a single action, such as the "Light On" and "Light Off" tasks. Or they can be longer, such as the "Introduction" and "New Products" tasks. See "Task Window" on page 51 for more details.

Timeline Window

Lengthy tasks are represented by timelines, such as the "Introduction" timeline shown in the lower left corner. The timeline, in its turn, is made up of cues, which represent the individual actions to take place along the timeline. These cues can be put onto separate tracks to simplify editing. See Chapter 7 for the full story on cues and "Timeline Window" on page 29 for more information about the timeline window.

Device Support

The Device Support window appears behind the other windows in the screen picture. Choose "Device Support" on the Window menu to show this window. It contains a full list of all the models of devices supported by TRAX. It also provides access to the built-in device information database, which contains further information about each particular device. To view this information, select a device in the list and click the "Info" button. See "Device Support" on page 63 for more details.

System Modes

In order to maintain compatibility with older Dataton control units, such as PAX and TRANSPAX+, TRAX can be used in "Backward Compatible" mode. This is the default mode when starting TRAX.

In order to take full advantage of all the new, interactive capabilities of TRAX, you must activate the "Interactive" mode in the Preferences dialog box.

Backward Compatible Mode

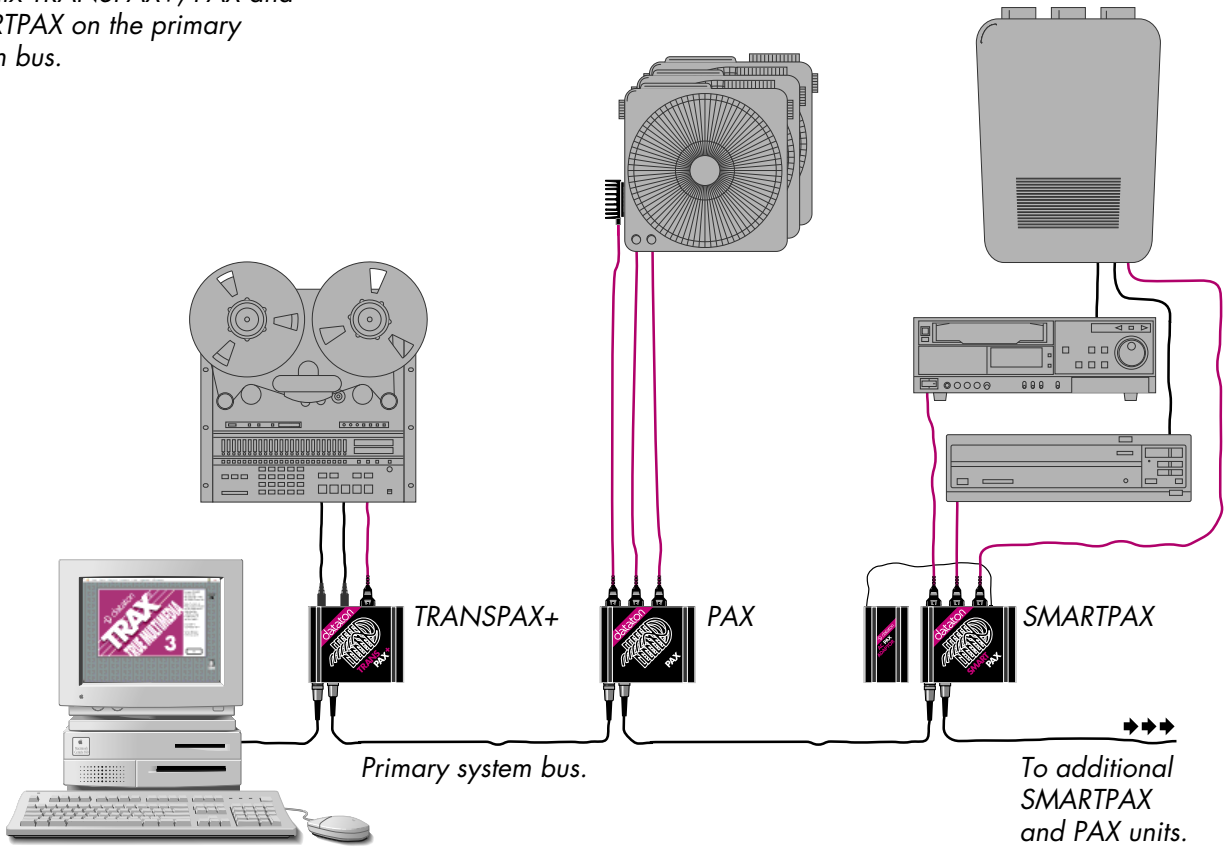
While in backward compatible mode, you can:

- Mix TRANSPAX+, PAX and SMARTPAX units in any order on the primary system bus.
- Run one or many preprogramming timelines, either free-running or synchronized to LTC SMPTE or EBU timecode received through a TRANSPAX+.
- Record a control signal (cue track) onto an audio track of a tape recorder, for later playback without the computer.
- Interact with the system using an AIRLINK connected to the ADB port of your computer, function or control keys on the computer's keyboard, or a simulated TOUCHLINK panel on the computer's monitor.

You can not:

- Receive feedback signals, such as switch closures or similar, from inputs connected to SMARTPAX units in the system.
- Synchronize timelines to other devices such as laserdisc or betacam decks controlled through SMARTPAX.
- Use the TOUCHLINK interactive touch panel.

In backward compatible mode, you can mix TRANSPAX+, PAX and SMARTPAX on the primary system bus.



Interactive Mode

The interactive system mode unlocks many of the new capabilities of TRAX version 3, and allows you to:

- Receive feedback signals, such as switch closures, analog faders or similar, from inputs connected to SMARTPAX units in the system.
- Synchronize timelines to most devices that can provide timing information, such as laserdisc or betacam decks. You can synchronize different timelines to the same device or different devices, even at the same time.
- Use TOUCHLINK interactive touch panels, as well as any number of AIR-LINK receivers connected through SMARTPAX ports.
- Perform cues and other actions at up to 400 actions per second, versus 50 actions per second in backward compatible mode.

In interactive mode, you can not:

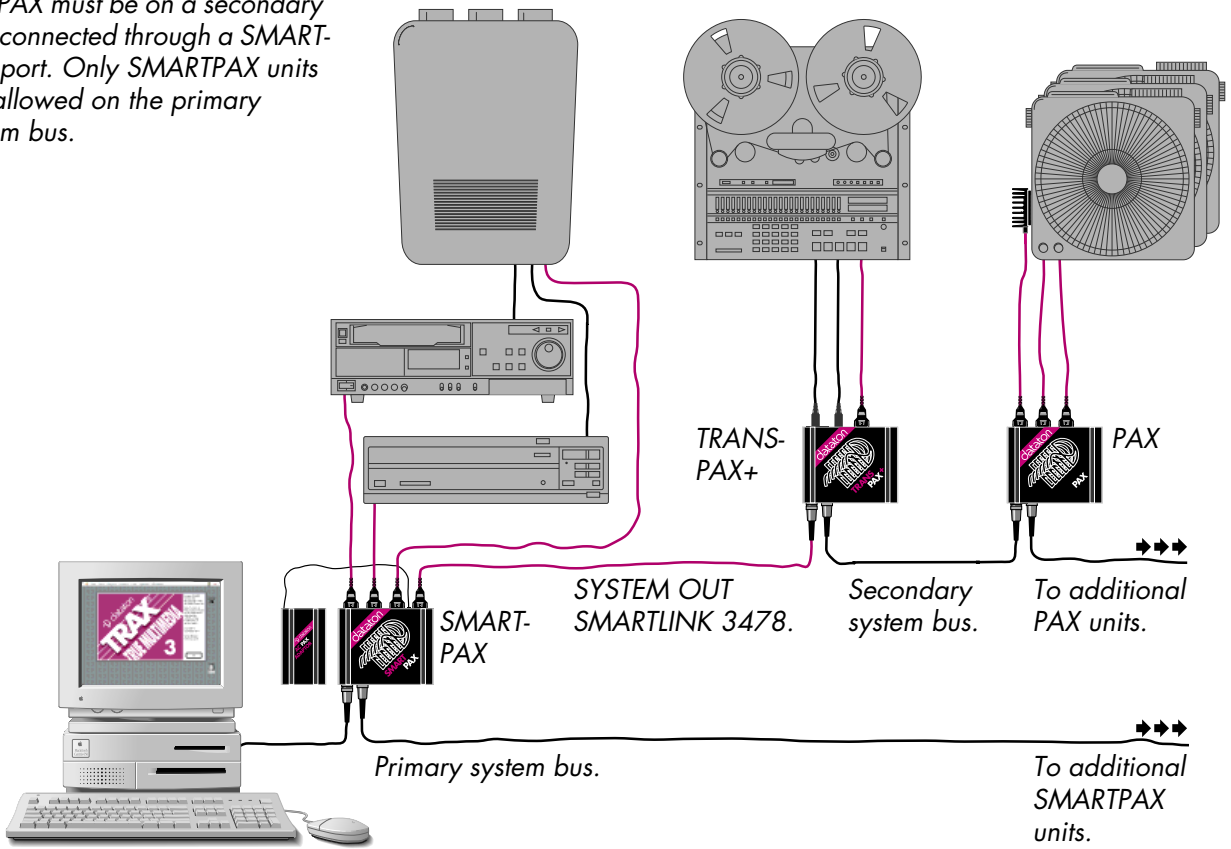
- Use PAX or TRANSPAX+ control units on the primary system bus. However, these units can be connected as a secondary bus through a SMARTPAX port (see Chapter 14 "PAX" and Chapter 15 "TRANSPAX+").
- Record a control signal (cue track) onto tape.

▼ **IMPORTANT:** Before activating the interactive mode for the first time, you must update all your SMARTPAX units with new software. See "Device Support" on page 63 for more details.

Choosing the Right System Mode

Choose the interactive system mode when you need to use active inputs, such as push-buttons or TOUCHLINK. Choose the backward compatible mode when working with systems consisting mainly of older control units such as TRANSPAX+ and PAX, or if you need to record the show on tape.

In interactive mode, TRANSPAX+ and PAX must be on a secondary bus, connected through a SMART-PAX port. Only SMARTPAX units are allowed on the primary system bus.

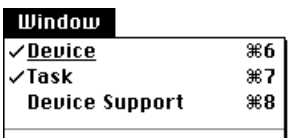


3 TRAX WINDOWS

The various objects manipulated in TRAX, such as cues and devices, are kept in their respective windows. This chapter tells you how to use these objects and their windows.

Opening and Closing Windows

You can open as many windows as you like. On a small monitor, there's a practical limit to the number of windows you may want to have open at any one time. Most Macintosh computers and compatibles allow you to connect a larger monitor and/or multiple monitors, which will provide more space for your windows.

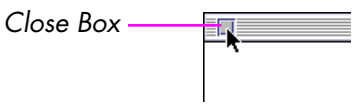


The three main windows in TRAX are opened using their respective commands at the top of the Window menu.

To open the timeline window for an existing timeline, first open the Task window using the Task command on the Window menu, then double-click the timeline's name in the Action column. To create a new timeline and open its window, choose "New Timeline" on the Window menu.

To open the status window for a device, select the device in the Device window and choose "Show Device Status" on the Object menu (keyboard shortcut: Command-R).

- **SHORTCUT:** By selecting "Double-clicking Opens Device Status" in the Preferences dialog box, the status window can be opened by simply double-clicking the device.



To close any window, click its close box, or choose "Close Window" on the File menu.

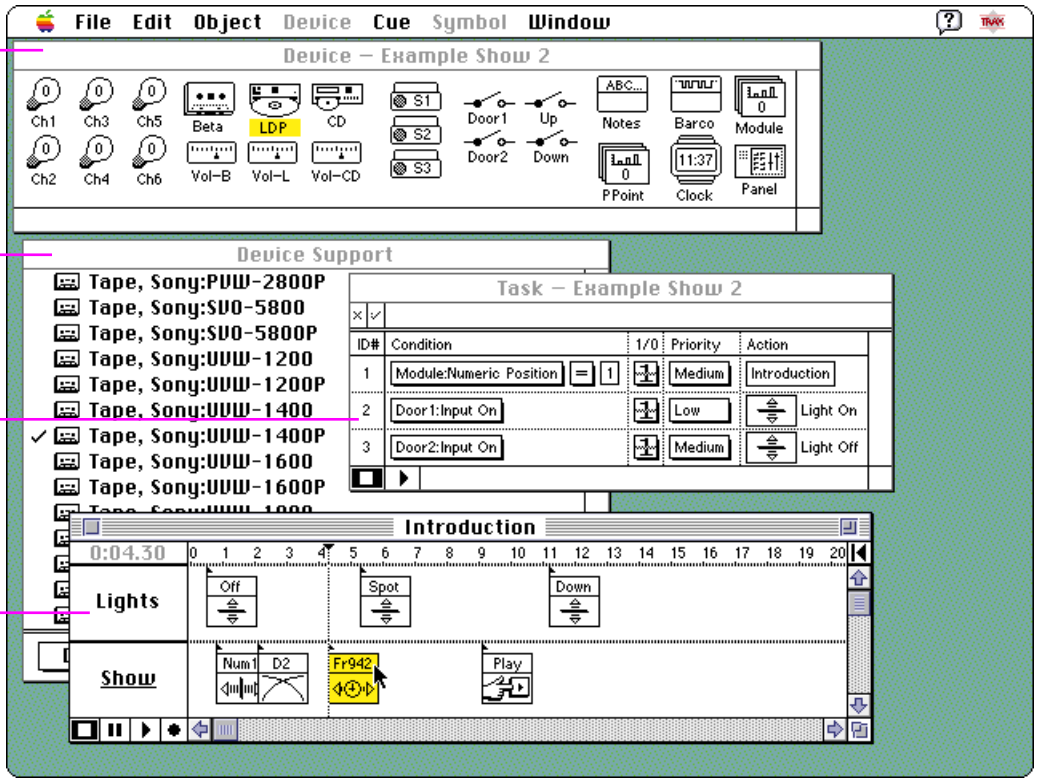
TRAX Main Windows

Device window, with icons representing all devices in the system.

Device Support window, listing all supported devices.

Task window, listing all the tasks with their starting conditions and actions.

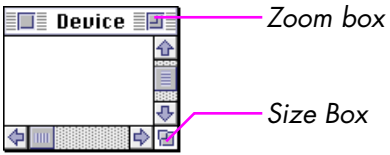
Timeline window opened by double-clicking the Action field of the first task in the list.



Moving and Resizing Windows

Move a window to its desired position on the monitor (or to another monitor) by dragging the window's title bar. TRAX remembers the window's position, and restores the window to its designated position the next time it is opened.

- **NOTE:** When opening the show on a computer with a smaller screen, or different screen configuration, TRAX may have to relocate windows to ensure that all windows remain on screen.



Many windows can be resized by dragging the size box, located in the lower right corner of the window. Clicking the zoom box, located in the upper right corner of some windows, zooms the window to full screen size. Click it again to return the window to its previous size and position.

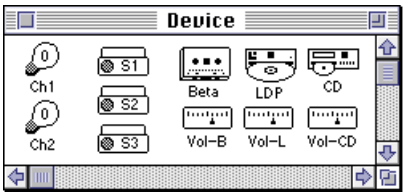
Only one window can be active at a time. The active window is indicated by stripes in the title bar. Most commands apply to the active window, or to the objects contained in it. To activate a non-active window, click in it.

Device assignment cursor

Device linkage cursor

- **NOTE:** The Device window is sometimes an exception to this rule, as clicking inside the window is also used to link devices to cues, buttons or other objects. This is indicated by the device assignment or device linkage cursors. In this case, clicking inside the Device window will not select the window, but rather alter the device linkage of the selected object in the active window. To activate the Device window in this case, click its title bar instead, or choose Device on the Window menu.

Device Window



All the devices in your system are represented by icons in the Device window. The icons can be arranged in the Device window to match the physical arrangement in the room or in a rack. The device icons serve three main purposes:

- They allow you to link a cue to the devices to be controlled by clicking the devices with the mouse (see "Device Assignment" on page 183).
- They provide basic device status information, allowing you to see, for example, if a laserdisc is playing or if a relay is closed.
- By double-clicking a device icon you access its dialog boxes, in which you can configure the device as well as control it interactively and see all its status information.

Adding Devices

Device assignment cursor

Device linkage cursor

To add a device to the Device window, first select the Device window by clicking its title bar or choosing "Device" on the Window menu. Then select the desired device type from the Device menu.

◆ **NOTE:** You can not always select the Device window by clicking inside it, as this action sometimes implies assigning devices to cues, panel items or tasks. This is indicated by the device assignment or linkage cursor. Instead, you must click the Device window's title bar or one of its inactive scroll bars.

When a device is created, TRAX will assign it a unique name and address. These can be changed as described under "Editing Device Specifications" on page 27.

Creating Multiple Devices

When creating multiple devices of the same kind, start by creating the first device and setting its various specifications as desired, before creating the remaining devices of this kind (see "Editing Device Specifications" on page 27). This will save you from setting the specifications individually for devices, as they will inherit their settings from the most recently edited device of that kind.

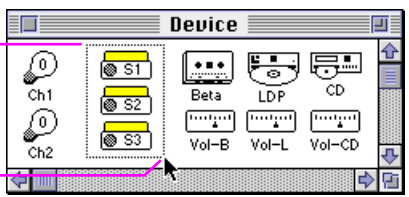
- **SHORTCUT:** Use the New command on the Device menu to create additional devices (keyboard shortcut: Command-N). This command creates a new device of the same kind as the last one chosen from the Device menu. The new device copies many characteristics specified for the previous device.

Selecting and Moving Devices

Select a device by clicking on it with the mouse when the Device window is active. Multiple devices can be selected or deselected by clicking each device while holding down the Shift key. Use the Select All command on the Edit menu to select all devices in the window. To select larger groups of devices, drag across the device window from a point outside all devices, enclosing the desired devices with the selection rectangle.

Drag from here…

…to here



You can move device icons in the window by first selecting them and then dragging on one of the selected icons. To constrain movement to horizontal or vertical directions only, press the Shift key as you drag. If you drag outside the

window content area, the window will scroll automatically. You may want to zoom the Device window to full screen size before re-arranging the devices in order to avoid accidental scrolling. Use the scroll bars along the bottom and right edges of the window to view other parts of the Device window or to scroll back to the top of the window.

- **HINT:** Pressing the arrow keys while holding down the Command key nudges the selected devices in that direction. Holding down both the Shift and Command keys moves them in larger steps.

Getting Devices from Other Shows

Use the Copy and Paste commands on the Edit menu to copy devices from one show to another:

- Open the show that contains the devices.
- Select the Device window by clicking its title bar.
- Select the devices you want.
- Choose Copy on the Edit menu.
- Open the show you want to copy them to (or create a new one using New on the File menu).
- Select the Device window in the new show and choose Paste on the Edit menu.

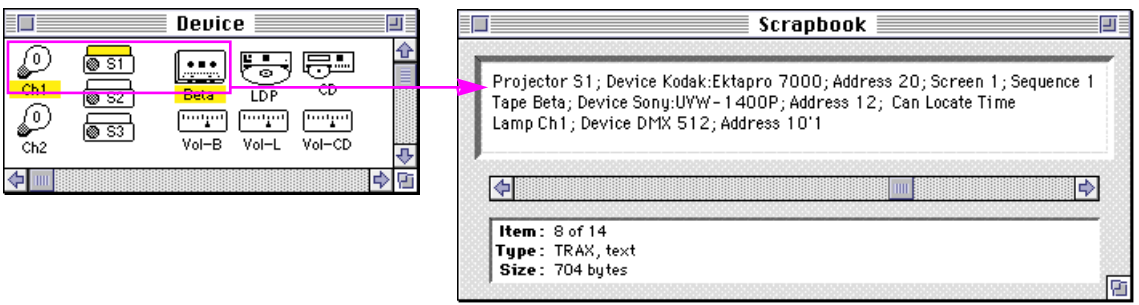
When copying devices from other shows or from the Scrapbook, you must make sure that all names and addresses are unique by editing any conflicting devices (see "Editing Device Specifications" on page 27).

Storing Devices in the Scrapbook

As an alternative to copying device arrangements directly from other shows, you can store recurring device arrangements in the Scrapbook.

- Open the show that contains the devices.
- Select the Device window by clicking its title bar.
- Select the devices you want.
- Choose Copy on the Edit menu.
- Open the Scrapbook by choosing it under the Apple menu.
- Choose Paste on the Edit menu.

The devices will show up as text in the Scrapbook. This makes it easy to find the right set of devices for copying into other shows.



Printing Devices

Although TRAX doesn't have any built-in print functions, you can still print out the device arrangement of a show using virtually any word processor, for example Simple Text. To print the contents of the devices in text form, copy the devices from the Device window as described above, then paste them into your favorite word processor program for printing. This can provide useful documentation for staging the show as the device list contains details such as the address and device driver specified for each device. You may want to add further "staging information" manually before printing the document.

To print out the Device window as a picture, zoom it to full screen size by clicking the zoom box in the upper right corner of the window. Then press Command-Shift-3 to take a snapshot of the screen. The snapshot ends up as a picture file on your hard disk, which can then be opened and printed from your word processor, paint program, etc.

◆ **HINT:** To print the picture, select the picture file in the Finder and choose Print on the File menu. This will print the picture using Simple Text.

Editing Device Specifications

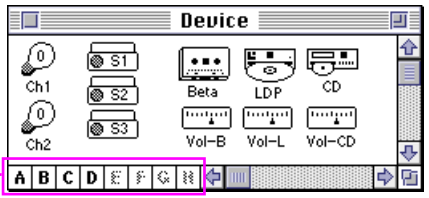
To change the specifications of a device, first select the device using the mouse, then choose Specifications on the Edit menu.

▼ **IMPORTANT:** The name and address of each device must be unique. You must manually change names and addresses of imported devices to avoid conflicts. If there are any conflicts, you will be notified when you try to leave the Device window. You must correct these before you can proceed.

Refer to Chapter 5 for information on each device's dialog box.

Device Gangs

The letters along the bottom of the device window represent the eight device gangs. The gang letters are only displayed when "Max Number of Gangs" is set to a non-zero value in the Preferences dialog box. See the description of the Gang cue on page 210 for details on how to use this feature.

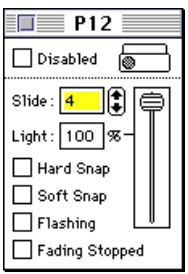


Gang Letters

Device Status Windows

In addition to the Device window, which shows icons representing all devices, you can also open an individual status window for each device. This shows the full status of the device, and allows you to change the status manually.

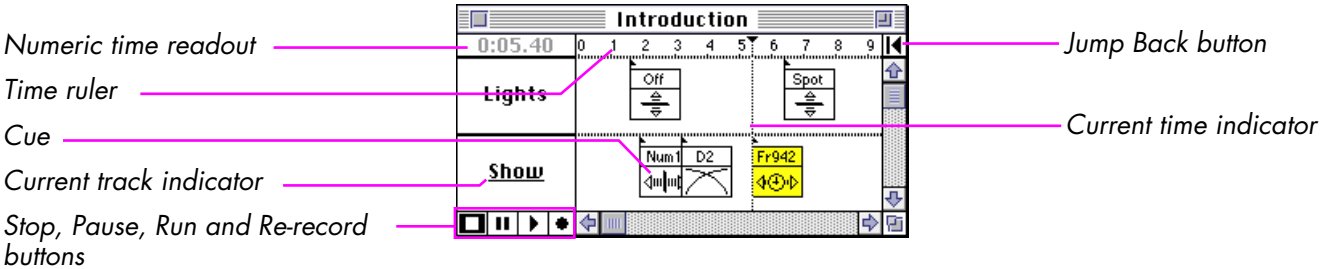
Please refer to Chapter 5 for full details on the device status window associated with each type of device.



The status window for a slide projector device.

Timeline Window

A timeline window represents the flow of your presentation. To make a device do something at a specific time, you place a cue with the desired functionality at that point on a timeline, and assign it to the device or devices to be affected.



Creating a New Timeline Window

You can create new timeline windows using the "New Timeline" command on the Window menu. Individual timelines can be started and stopped independently, allowing you to use separate timelines to control different areas of a larger presentation environment, such as a museum. Or you can use separate timelines to break up your show into independent sections.

Opening a Timeline Window

If you close a timeline window, you need to go through the Task window to open it again.

- Choose "Task" on the Window menu.
- Locate the name of the timeline to be opened in the Action column of the Task window.
- Double-click the task's name.

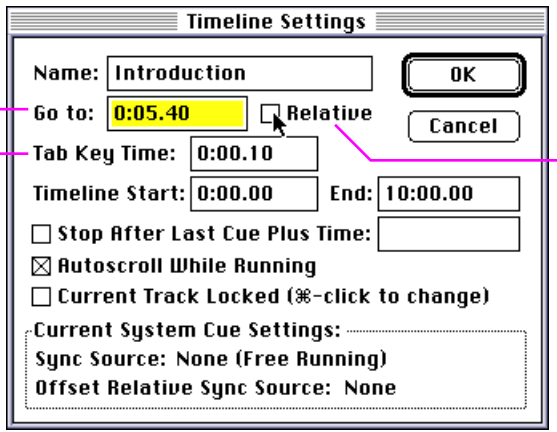
Current Time Position

The current time position of the timeline is displayed numerically in the upper left corner of the timeline window. It is also indicated by the gray, vertical line through the cue area. New cues will be entered into the show at the current time position. To move to another time position in the show, click a cue or click at the desired position on the time ruler.

Alternatively, use the Timeline Settings command on the Window menu to go to a position by entering its time numerically. The time can be entered either in an absolute or a relative way. If you specify relative, enter a negative time value to move backwards in the show by that amount of time. See "Timeline Settings" on page 103 for more details.

Enter a time to go to.

Pressing the Tab key in the timeline window jumps ahead by this amount of time.



Select "Relative" to jump forward or backward by the specified amount of time.

- **SHORTCUT:** Pressing the + or – keys while a timeline window is active automatically opens the Timeline Settings dialog box and selects the Relative mode. This is a quick way to jump forward or backward a specified amount of time. Double-clicking the numeric time readout in the Timeline window is another shortcut for opening this dialog box.

Pressing the Tab key in a Timeline window makes it jump forward by the amount of time specified in the Timeline Settings dialog box. Pressing the Tab key while holding down the Shift key makes it jump backward by the same amount.

When the current time position is scrolled out of view, the numeric readout is displayed in italics and shows the time of the displayed section rather than the current time position. Use the Jump Back button in the upper right corner of the timeline window to display the current time position.

Setting the Length of the Timeline

You can specify the start and end point of a timeline in the Timeline Settings dialog box. Normally, the start point is 0:00.00. However, if you're synchronizing to an external timecode source, you may want to set another start time in order to match the timecode.

If you know the final length of the timeline you're working on, it's a good idea to set the end time of it before you start programming. In that way the scroll bar along the bottom of the timeline window will match the length of the final show all the time, making it easier for you to see where you are. If you don't specify the end point – or specify a value that's too small – TRAX will automatically increase the end time by one minute whenever you place a cue within 15 seconds from the current end point.

Tracks

A timeline window contains 16 horizontal tracks, initially named Track 1 through Track 16. New cues are added to the current track, which is indicated by an underlined track name. To change the current track, click the desired track name or select a cue on the desired track. To change the name of a track, first select the track then choose Track Name on the Window menu, or simply double-click the track name.

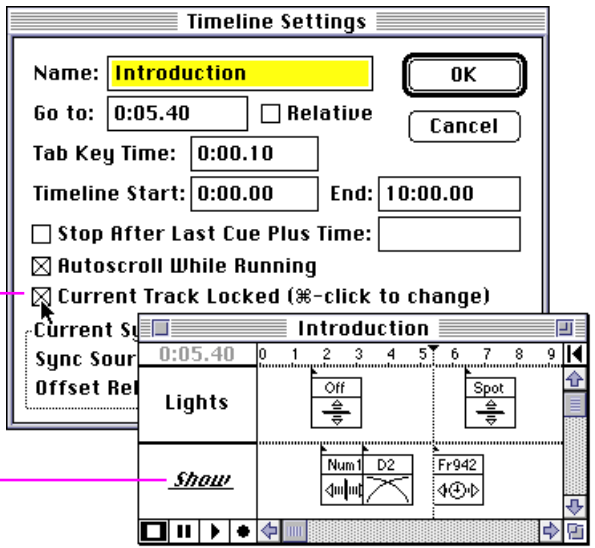
Current track indicator. Double-click to rename track.

You can use the tracks in any way you see fit. For a show that uses many media, it may be a good idea to put cues that control, for example, lighting on one track and cues for video on another, and name the tracks appropriately. For a show using a lot of slide projectors, you may want to dedicate separate tracks to the individual screen areas, or simply use them as parallel timelines in order to simplify complex cue sequences on multiple projectors.

Another way to use the tracks is to have one track for new cues. Once the cues have been edited and synchronized, you can "mix down" that track onto another track with finished cues (see "Moving Cues" on page 37).

Locking the Current Track

You can lock the current track to avoid selecting another track by accident. This is particularly useful when using the current track as a "stop track" for speaker support purposes (see "Speaker Support" on page 226). To lock the current track, first select the track then choose Timeline Settings from the Window menu and check the Current Track Locked check box. When locked, the name of the current track will appear in italics. To change the current track, either remove the lock first by un-checking the check box or click the name of the desired track while holding down the Command key.

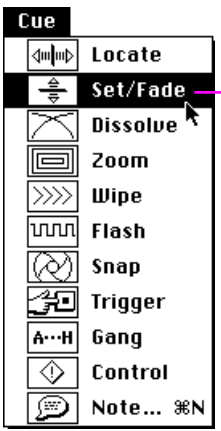


Locks current track so it can't be changed by mistake.

Italics indicate locked current track. Command-click to select another track.

Creating Cues

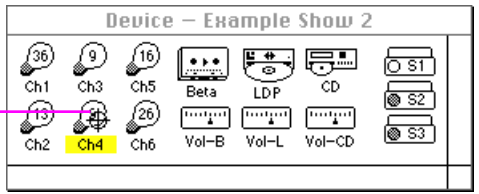
To add a cue to a timeline, first make sure that the timeline window is activated, then choose the desired cue type from the Cue menu. The new cue will be entered into the timeline window on the current track and at the current time position. If any devices are selected in the Device window when you create a cue, the cue will be assigned to those devices (see "Assigning Devices to Cues" on page 40).

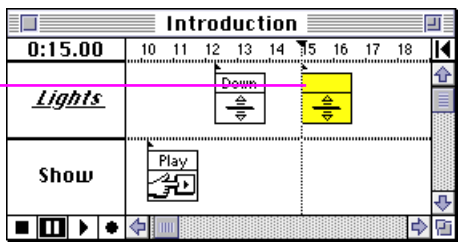


1. Select the device.

2. Choose a cue.

3. The cue is entered at the current time and track.





Selecting Cues

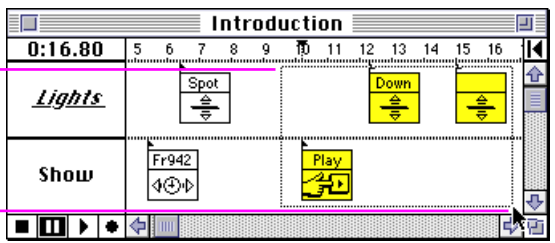
This section discusses how to select cues in Icon View, which is very similar to selecting files in the Macintosh Finder. For information on how to select cues in list view, see "Selecting Cues in List View" on page 48.

To select a single cue, simply click it with the mouse. Clicking an unselected cue automatically deselects all other cues. To deselect all cues, click in the white space between cues. Press the Shift key while clicking a cue to toggle its selection state without affecting the selection state of any other cues. When selecting individual cues in this way, be careful not to move the mouse while clicking as this may accidentally move the cue in time. If this happens, immediately choose Undo on the Edit menu to restore the cue to its proper position.

To select a group of cues, drag across them diagonally from a point outside all the cues. All cues touched or enclosed by the selection rectangle will be selected. To select, or deselect, additional groups of cues, press the Shift key before dragging the selection rectangle.

Drag from here…

…to here.



Advanced Selection Techniques

To select all cues within a range of time, drag horizontally across the time ruler. To select a wide range of cues first click the time ruler at the beginning then shift-click at the end. To select all cues from the current time position to the end of the show, choose Select to End on the Edit menu (Command-E).

To select all cues on specific tracks, drag vertically across the track titles.

Press the right or left arrow keys to select the next or previous cue on the current track. Pressing these arrow keys in conjunction with the Shift key selects the next or previous cue on any track. This allows you to "single step" through the show, one cue at a time.

In the same way, you can use the down-arrow key to run in real time up to the next cue on the current track. This uses the current track as a "stop track" (see "Speaker Support" on page 226). Hold down the Shift key as you press the down arrow to run to the next cue on any track.

Use the Find command on the Edit menu to select cues matching a certain search criteria, for example all cues referring to a particular device or having a specific dissolve rate. You can use multiple Find commands to apply additional search criteria. See "Find/Replace" on page 85 for more details.

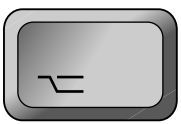
Moving Cues

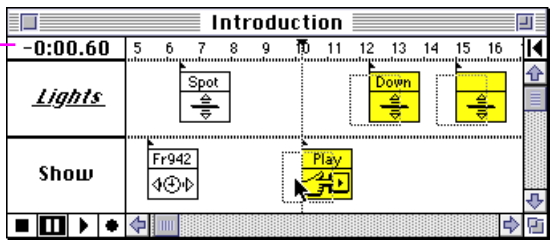
Cues can be moved by simply dragging them with the mouse. Press the Shift key while dragging to constrain movement. This makes it easier to move cues from one track to another without shifting them in time.

- **NOTE:** To constrain the movement of selected cues, press the Shift key *while* dragging the cues. Don't press it before you start to drag, as that will toggle the selection state of the clicked cue.

Pressing the Option key while dragging cues horizontally changes the numeric time readout in the Timeline window to indicate relative time, indicating how far you have moved the cues as you drag them.

Press the Option key as you move the cues to see the relative time distance.





Moving Cues using the Keyboard

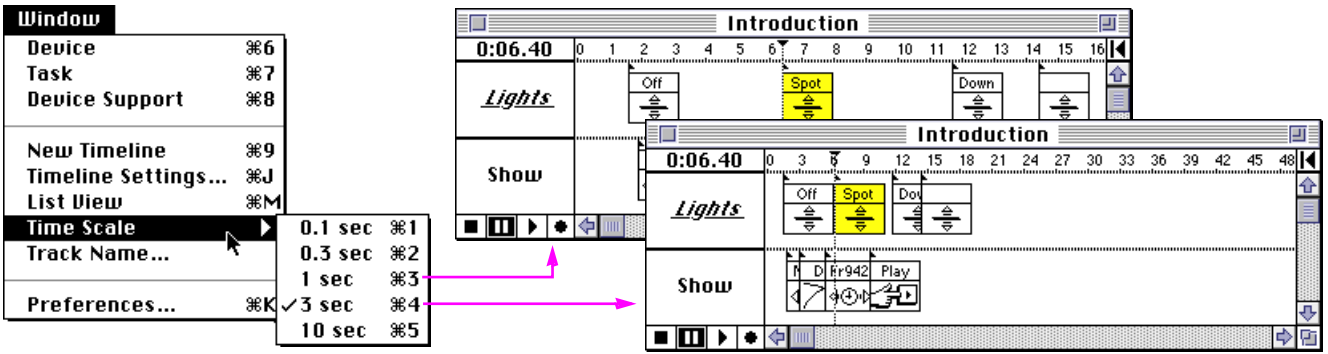
Pressing the up or down arrow keys while holding down the Command key moves selected cues up or down one track at a time. Pressing the right or left arrow keys in conjunction with the Command key nudges them horizontally in steps of 0.01 seconds. Pressing both the Shift and Command keys moves them in 0.1 second steps.

Command-Tab moves the selected cues by the Tab Key Time specified in the Timeline Settings dialog box (see "Tab Key Time" on page 104). Command-Shift-Tab moves the cues backwards by the same amount.

- **NOTE:** This can be used for example to move cues one video frame at a time by setting the Tab Amount to the corresponding time.

Changing the Time Scale

Using the Time Scale commands on the Window menu you can zoom in or out on the timeline. Smaller time-scale values give better precision in moving cues with the mouse, and allow you to see cues that are close together. Larger time-scale values provide a better overview and make it easier to select a long time range. Command-1 through 5 correspond to the five time scales.



Editing Cue Specifications

To change the specifications of an individual cue, first select the cue as described earlier, then choose Specifications on the Edit menu (Command-I), or press the Enter or Return key. Refer to Chapter 7 for details on each cue type.

SHORTCUT: Double-clicking the cue has the same effect as selecting it and choosing the Specifications command.

You can change specifications of multiple cues simultaneously using the Expand/Compress and Find/Replace commands (see page 90 and page 85 respectively).

Assigning Devices to Cues

Device assignment pointer: ⌖

You have to assign the desired devices to a cue in order for it to have any effect. This is done by first selecting a cue and then clicking each device using the device assignment pointer. The device assignment pointer is only shown when the Task window or a timeline window is selected and the pointer is within the Device window.

You can use all the standard selection techniques to assign devices to a cue (see "Selecting Devices" on page 24). When assigning devices to existing cues, make sure that the cue is selected before you start clicking devices. When creating new cues, you can select the desired devices before or after creating the cue.

IMPORTANT: Be careful how you use the device assignment pointer, as it changes the device assignment of any selected cue. If you want to work with the devices only, first select the Device window by clicking its title bar.

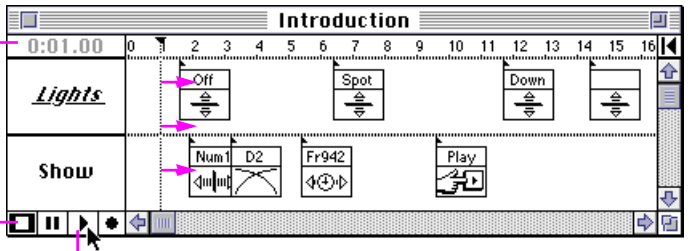
Running the Timeline

To run the timeline from the current time position, click the play symbol in the lower left corner of the timeline window. The current time indicator will start to move in the timeline window. When the time indicator reaches the middle of the track area, the window will auto-scroll to keep the current time centered. This feature can be disabled using a checkbox in the Timeline Settings dialog box (see "Autoscroll While Running" on page 105).

Gray time readout indicates a stopped and inactive timeline.

Click the Stop symbol to make the timeline inactive.

Click the Play symbol to activate and run the timeline.



To stop running the show, click the pause symbol or any other object on the screen, or press a key.

- **SHORTCUT:** Press the space bar to toggle between the play and pause mode of a timeline.

Stopping vs. Pausing a Timeline

There's an important difference between stopping or just pausing a timeline. When a timeline is stopped, it becomes inactive and relinquishes control over its devices, thus freeing those devices to be used by other tasks. See "Device Ownership" on page 121 for more information on the relationship between tasks and devices.

You stop a timeline by clicking the Stop symbol in the lower left corner of the timeline window. The timeline can also be configured to automatically stop a specified amount of time after its last cue (see "Stop After Last Cue" on page 105). A stopped timeline can't control any devices – you must first activate the timeline by selecting pause or run.

Initial Device Status

When you start a timeline after having been in stop mode, it will accept the current status of the devices as their correct initial position. This device status will be restored whenever you jump back to the beginning of that timeline.

In some cases, you may want to have more explicit control over the initial device status for a timeline. You may, for example, want all slide projectors controlled by a timeline to go to tray position 0 and turn their lamps off. To accomplish this, use a "Trigger: Reset" cue, as described on page 209.

Synchronizing a Timeline to a Device

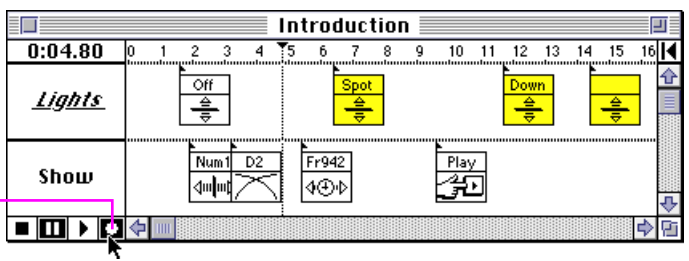
A timeline can be synchronized to the time position of any device capable of supplying such information. Use a Control cue at the beginning of a timeline, assigned to the device to be used as the sync source (see "Synchronize To" on page 214).

Re-recording Cues

In addition to positioning cues manually along the timeline by dragging them with the mouse, it is also possible to position them by tapping the space bar in real time as you run the timeline. This is referred to as re-recording the cues, as the cues to be positioned are temporarily removed from the timeline and then re-recorded again – one by one – as you tap the space bar.

You can use this method either to re-record cues in relation to other cues, or to an external timecode source coming from a device (see "Synchronizing a Timeline to a Device" on page 42). Re-recording relative to a device is particularly useful as it makes it easy to achieve good timing between the audio and the visuals.

Before you start, you must decide which cues to re-record. This can be done either manually or automatically. The automatic method selects all cues ahead on the current track. This method is appropriate after adding new cues to the end of the timeline and all cues to be synchronized are on the same track. To use the automatic method, first click on the time ruler at the point from which you want to start re-recording, then click the record symbol in the bottom left corner of the timeline window. This automatically selects all cues ahead on the current track.



Clicking the re-record button with no cues selected selects all cues ahead on the current track.

If the cues are scattered over several tracks, or if you just want to re-record specific cues in the middle of the show, then manually select the cues before you click the record symbol in the bottom left corner of the timeline window.

If you want some pre-roll before synchronizing the first cue, type a minus sign and the desired pre-roll time after selecting the cues. This will move the current time position back by the specified amount without deselecting the cues.

To start re-recording, click the play symbol in the lower left corner of the timeline window, then tap the spacebar to re-record each cue.

- **IMPORTANT:** If the timeline is synchronized to a device which can not be controlled by TRAX, such as a tape deck interfaced through a TRANSPAX+ not using a locator adaptor or remote cable, you must press the play button on the tape deck instead of the one in the timeline window.

When you click the play symbol, the selected cues are temporarily moved into a synchronization stack, with only the topmost cue visible. Tap the space bar to re-record each cue. If you make any mistakes while re-recording the cues, simply choose Undo on the Edit menu to restore all the re-recorded cues to their previous positions.

- **NOTES:** Cues retain their tracks when re-recorded. Grouped cues are re-recorded together with one tap of the space bar. Re-recording is not available in List View.

The Jump Back Button

The Jump Back button is located in the upper right corner of the timeline window. It serves two purposes:

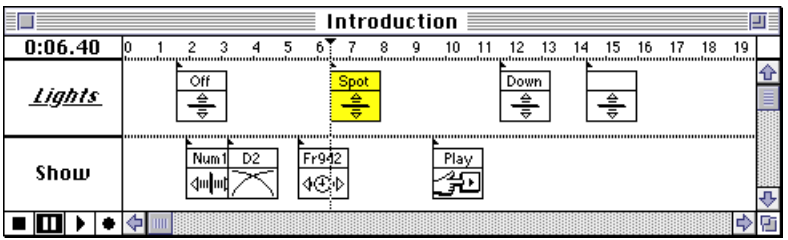
- It causes the window to scroll to the current time position if this has been scrolled out of view. This is indicated by the double-arrow symbol in the Jump Back button.
- It makes the window jump back to the show's last start position, indicated by the single arrow symbol in the Jump Back button.

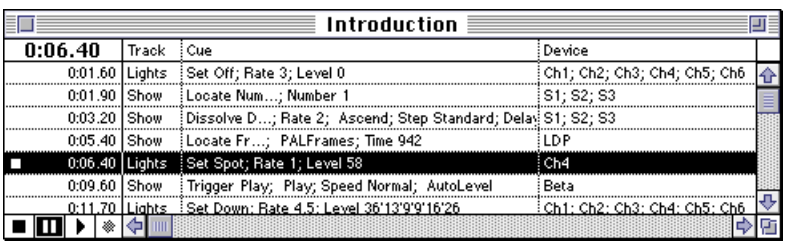
When the current time position is scrolled out of view, the double-arrow symbol in the Jump Back button indicates in which direction the current time is located. In this case, the numeric time readout in the timeline window is italicized, and shows the time position of the displayed show section rather than the current time position in the show.

List View

While the standard view of cues provides excellent timing information about the cues and their relationships to each other, it does not show all cue details. In order to see which devices are assigned to a cue you need to select the cue, and to see its various settings you must double-click it to open its dialog box. In both cases, you can only see the details for one cue at a time.

Switching a timeline window over to List View, using the command on the Window menu, changes all that. In the List View you can see all details for all cues currently visible in the timeline window.




Introduction
0:06.40
Track
Cue
Device
0:01.60 Lights Set Off; Rate 3; Level 0 Ch1; Ch2; Ch3; Ch4; Ch5; Ch6
0:01.90 Show Locate Num...; Number 1 S1; S2; S3
0:03.20 Show Dissolve D...; Rate 2; Ascend; Step Standard; Delay S1; S2; S3
0:05.40 Show Locate Fr...; PALFrames; Time 942 LDP
0:06.40 Lights Set Spot; Rate 1; Level 58 Ch4
0:09.60 Show Trigger Play; Play; Speed Normal; AutoLevel Beta
0:11.70 Lights Set Down; Rate 4.5; Level 36'13'9'9'16'26 Ch1; Ch2; Ch3; Ch4; Ch5; Ch6

SHORTCUT: Command-M toggles between icon and list views.

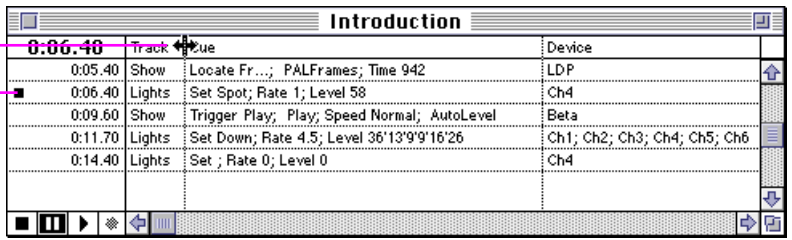
In List View, the next cue to be executed (corresponding to the current time position in Icon View) is indicated by a small square to the left of the cue's time display. The width of the track, cue and device columns can be adjusted by dragging the gray separator lines.

You can perform most editing functions in the List View just as you can in the Icon View, including cut, copy, paste, etc. When pasting multiple cues, keep in mind that they will be merged time-wise with any existing cues at that point in the show, which is different from how a word processor inserts text, for example.

You can not drag cues around or re-record cues in List View. Use the keyboard shortcut Command-M to switch back and forth between these views.

Drag the gray separator lines to re-size the columns.

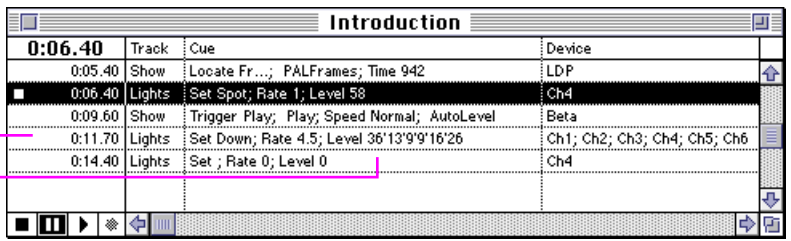
The box indicates next cue to be executed.


Introduction
8:06.40
Track
Cue
Device
0:05.40 Show Locate Fr...; PALFrames; Time 942 LDP
0:06.40 Lights Set Spot; Rate 1; Level 58 Ch4
0:09.60 Show Trigger Play; Play; Speed Normal; AutoLevel Beta
0:11.70 Lights Set Down; Rate 4.5; Level 36'13'9'9'16'26 Ch1; Ch2; Ch3; Ch4; Ch5; Ch6
0:14.40 Lights Set ; Rate 0; Level 0 Ch4

Selecting Cues in List View

Selection of individual cues works in the same way in both list and icon views. To select a range of cues in list view, either drag across the cues vertically or Shift-click in the time column to extend a selection. Switch back to icon view to select cues on specific tracks or other more complex combinations. You can freely switch back and forth between the two views without disturbing the selection state of the cues.

Using the Find command on the Edit menu allows you to select cues based on any text string that appears in the Cue or Device fields. You can, for example, copy a part of a cue's text (see "Editing in List View" on page 49) and paste that into the Find dialog box to select all cues that contain that text in the cue column. See "Find/Replace" on page 85 for more details.


Introduction
0:06.40
Track
Cue
Device
0:05.40 Show Locate Fr...; PALFrames; Time 942 LDP
0:06.40 Lights Set Spot; Rate 1; Level 58 Ch4
0:09.60 Show Trigger Play; Play; Speed Normal; AutoLevel Beta
0:11.70 Lights Set Down; Rate 4.5; Level 36'13'9'9'16'26 Ch1; Ch2; Ch3; Ch4; Ch5; Ch6
0:14.40 Lights Set ; Rate 0; Level 0 Ch4

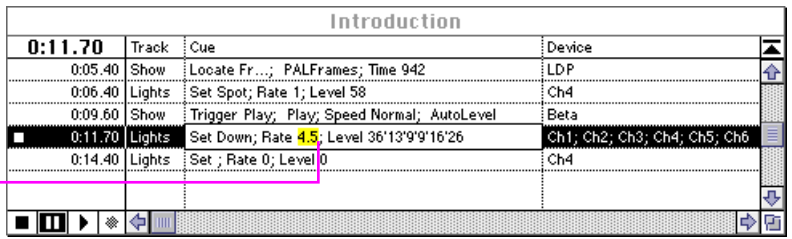
Shift-click in the time column to select a range of cues.

Shift-click here to select individual cues.

Editing in List View

You can edit cues in List View either using the cue's dialog box, just as in icon view, or by highlighting the text in the Cue column. This is particularly useful to change values such as lamp levels, dissolve rates or frame positions. To edit a value in a cue in list view, drag horizontally across the value. This selects the value and allows you to type over it without going through the dialog box. Press Enter or Return when you've finished editing, or press Escape to cancel the editing.

Drag across a value to edit it.


Introduction
0:11.70
Track
Cue
Device
0:05.40 Show Locate Fr...; PALFrames; Time 942 LDP
0:06.40 Lights Set Spot; Rate 1; Level 58 Ch4
0:09.60 Show Trigger Play; Play; Speed Normal; AutoLevel Beta
0:11.70 Lights Set Down; Rate 4.5; Level 36'13'9'9'16'26 Ch1; Ch2; Ch3; Ch4; Ch5; Ch6
0:14.40 Lights Set ; Rate 0; Level 0 Ch4

In this way it is possible to change or enter any information in any cue, using the syntax displayed in List View. When entering keywords (i.e., words that are names of specific fields or named values), you only need to type the first few letters of the keyword.

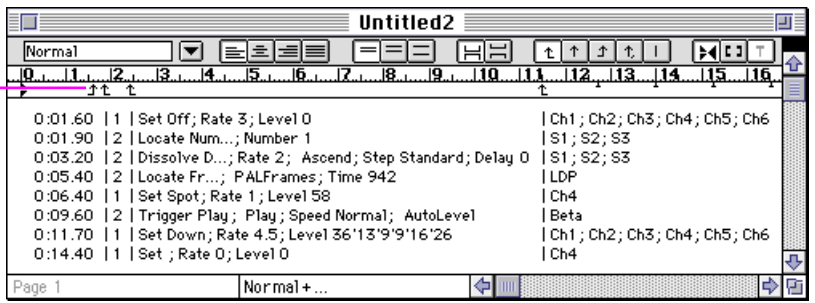
It is not, however, possible to change the time, track or device assignment of a cue in this way. To change the device assignment, click the devices as usual. Switch to the icon view (Command-M) to change the time or track of a cue or use the nudging commands (Command-arrow key or Command-Shift-arrow key).

Printing Cues

Although TRAX doesn't have a print command as such, you can use any word processor to print out the cues just as you see them in List View. Select the cues you want to print and choose Copy on the Edit menu. You can then paste them into your favorite word processing program.

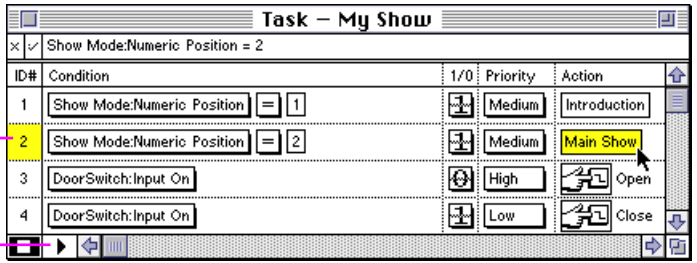
There's a tab and a vertical line between each field in List View. Add corresponding tab stops in your word processor to align the columns. The example below shows how to format the cues in Microsoft Word. Note that the leftmost tab is right aligned while the other three are left aligned. It might be a good idea to save the word processor document as a stationary document to re-use this format for future print-outs.

Use tabs to align the columns.


Untitled2
Normal
0:01.60 | 1 | Set Off; Rate 3; Level 0 | Ch1; Ch2; Ch3; Ch4; Ch5; Ch6
0:01.90 | 2 | Locate Num...; Number 1 | S1; S2; S3
0:03.20 | 2 | Dissolve D...; Rate 2; Ascend; Step Standard; Delay 0 | S1; S2; S3
0:05.40 | 2 | Locate Fr...; PALFrames; Time 942 | LDP
0:06.40 | 1 | Set Spot; Rate 1; Level 58 | Ch4
0:09.60 | 2 | Trigger Play; Play; Speed Normal; AutoLevel | Beta
0:11.70 | 1 | Set Down; Rate 4.5; Level 36'13'9'9'16'26 | Ch1; Ch2; Ch3; Ch4; Ch5; Ch6
0:14.40 | 1 | Set ; Rate 0; Level 0 | Ch4
Page 1
Normal+...

Task Window

The Task window lists all tasks that make up your show, together with the starting conditions that determine when each task will be started. It also contains the play button for activating the starting conditions.



Click here to select the task.

Click here to activate the starting conditions.

Adding a Task

The Action column contains the action that is performed by the task. An action may be either a timeline or a single cue. To create a task with a timeline, choose "New Timeline" on the Window menu.

To create a task consisting of a single cue, choose the cue from the Cue menu. Link the cue to a device by first selecting the cue in the Action column and then selecting the device in the Device window (see page 24).

The new task will be inserted before the currently selected task in the list, or appended to the list if there's no selection.

Editing the Task's Action

To edit a task's action, select it in the Task list and choose Specifications on the Edit menu, or simply double-click the action item. When opening a timeline action, such as "Main Show" in the illustration above, it opens to a timeline window which can then be left open, if desired. When opening a single cue action for editing, you must finish editing the cue before you can proceed.

Selecting and Moving Tasks

To select a single task, click its ID number or action field. To select a range of tasks, start by selecting the first task then select the last task while holding down the Shift key. To select or de-select individual tasks, hold down the Command key while clicking.

Tasks can be moved in the task list by selecting the tasks to be moved, choosing Cut on the Edit menu, selecting the task at the line where you want the tasks to go, and choosing Paste on the Edit menu.

You can also copy tasks from other shows. When copying a task containing a timeline, all cues on that timeline will be copied as well.

▼ **IMPORTANT:** When copying tasks or individual cues between shows, make sure that all devices referenced by the tasks exist in the target show, and have the same names. If not, cues will not be assigned properly to the devices. If necessary, first copy the devices to the other show, then the tasks or cues.

Deleting a Task

To delete a task, first select it as described above, then choose "Clear" on the Edit menu.

▼ **CAUTION:** When deleting a task whose action item is a timeline, that timeline and all its cues will also be deleted.

Changing a Task's Priority

Use the Priority pop-up menu in the Task window to change a task's priority. The task's priority determines which task will be granted access to a device if two or more tasks attempt to use the same device.

For example, in the Task window illustration on page 51, the task that opens the door has higher than normal priority, and the task that closes it has lower than normal priority. Assuming that the door is also controlled by cues in the

Main Show timeline, these priorities would dictate that the door can be opened using the door switch while the show is running, but it can not be closed.

- **IMPORTANT:** The priority of a task doesn't affect whether it can be started or not. It only affects a task's ability to control devices currently in use by other tasks. Whether a device is currently in use by a Task is indicated in the title bar of the device's configuration dialog box (see "Device Ownership" on page 121).

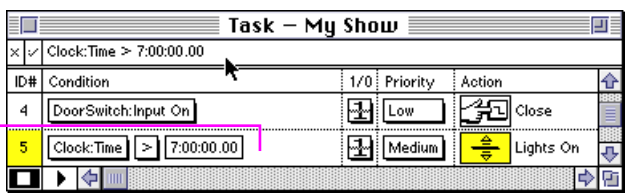
You can use Control cues to make tasks start and stop each other. A Control cue can also be used to verify that all devices required by a timeline are indeed available. See "Control" on page 212 for more details.

Specifying the Starting Condition for a Task

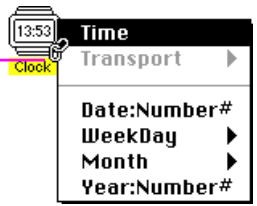
A task will be started under the condition stated in the Condition column. Such a condition is based on the various *status properties* of the devices in the Device window.

For example, the Close task in the Task window shown below will be started when the Input On property of the DoorSwitch device becomes true. The DoorSwitch device is a simple contact-closure input, connected to a mechanical toggle switch.

Click in a task's condition column to edit the condition.



Linking Conditions to Device Status



Device linkage cursor.

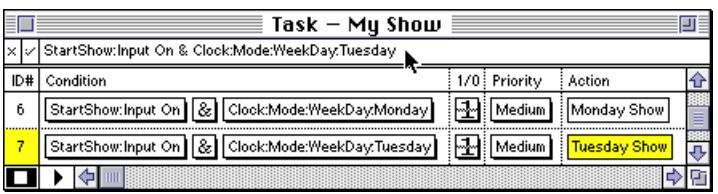
To link a task to the device status property that should start it, first click in the Condition field of the task, then click the device in the Device window. When you press the mouse button on the device's icon, it displays a pop-up menu, listing the various status properties of the device.

You can refer to any status of any device – both input and output – in order to construct starting conditions for tasks. For example, to have a task started at a certain time of the day, add a "Clock" device to the Device window, then link the task's condition to its Time status. This is shown in the "Lights On" task on page 53, which will be started at 7:00 AM every day.

▼ **IMPORTANT:** When referring to time values, always use the "is greater than" or "is less than" symbols. Do not use the "is equal to" symbol, as the task may then not be started.

Conditions Based On Multiple Status Properties

In the same way, you can start different tasks using the same button by combining the input switch with, for example, the day of the week using an "and" symbol.

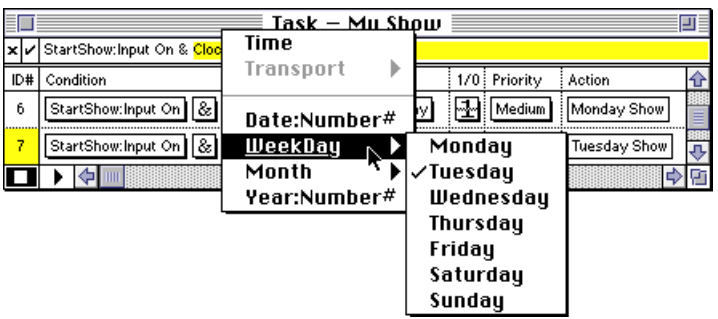


Please refer to "Symbol Menu" on page 96 for a full rundown of all the symbols you can use in task conditions.

Editing Conditions

When you click in the condition field of a task, this also activates the edit field at the top of the Task window. If the task already has a condition, the condition is displayed in the edit field. This can be used to view long conditions without changing the column width of the Condition column.

Most items in a condition can be entered using the mouse, either by selecting properties from devices or by selecting symbols from the Symbol menu (see "Symbol Menu" on page 96). Existing condition items can be edited using the mouse, which displays a pop-up menu with the other choices available for the clicked item. For example, clicking the "Clock:Mode:Week-Day:Tuesday" item in the task with ID# 7 displays a pop-up menu showing the other status properties in the Clock device, as well as the possible settings for the currently selected property.

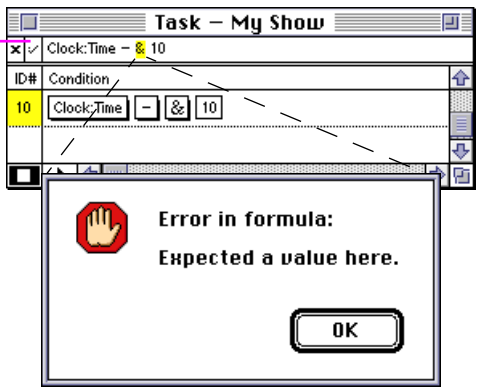


Clicking a condition item also highlights the corresponding text in the edit field at the top of the window. Thus, to replace one device reference with another, first click the old reference in the condition, then pick a property from another device.

The cross and check-mark symbols to the left of the edit field serve as Cancel and OK buttons for the edit field. Click the check-mark to accept the entry. Pressing the Enter or Return keys has the same effect.

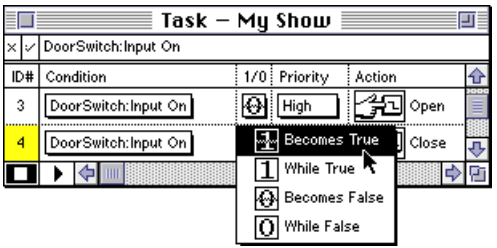
Furthermore, the check-mark also indicates the validity of the condition as entered into the edit field. If you enter a condition that doesn't make sense, the check-mark symbol is grayed out. Pressing the Enter key in this case displays an error message and selects the offending item in the edit field.

Gray checkmark indicates error in condition formula.



Condition Variants

The pop-up menu in the "1/0" column allows you to specify whether the action should be started when the condition becomes *true* or when it becomes *false*. In the example below, the "Open" task will be started when the switch is turned off and the "Close" task will be started when it is turned on.



Choosing "While True" or "While False" causes an action to be performed repeatedly for as long as the condition is true or false, instead of just once when it *becomes* true or false.

The action will run until its end is reached before being re-started. For single cue tasks, this is usually in the range of a tenth of a second. For timelines, the duration can be specified using the Timeline Settings command on the Window menu (see "Timeline Start/End" on page 104).

Using Constants in Conditions

You can use constant numeric and time values in conditions, such as in the time-of-day example in the illustration on page 53. Use the keyboard to enter a numeric value into the text field at the top of the Task window. First click in the Condition field of the desired task, then type the desired value into the text field.

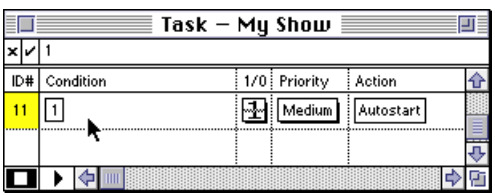
When entering time values, you must use the standard time format (see "Standard" on page 137). To convert from other time formats, you can use the time format pop-up menu in, for example, a Locate cue's dialog box.

▼ **CAUTION:** When entering time values, remember that TRAX interprets a time entered as 7:30 as 7 minutes and 30 seconds – not as 7:30 am. To enter the time 7:30 am, type 7:30:00.

Making a Task Start Automatically

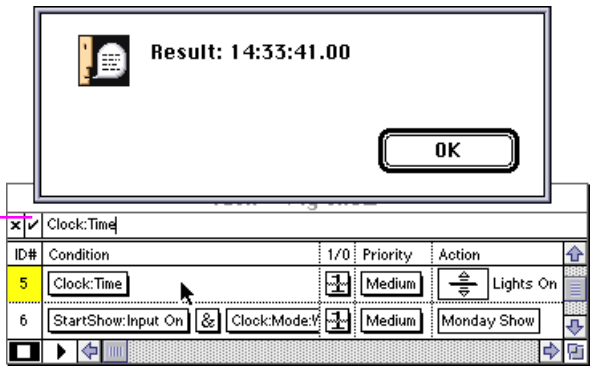
As TRAX considers any condition that evaluates to a non-zero result to be true, you can make a task start automatically by putting a non-zero constant value – for example 1 – into its condition field and setting its "1/0" pop-up menu to "Becomes True".

Any task configured in this way will be started automatically as soon as the system run mode is activated (see "Running the Tasks" on page 60).



Evaluating Task Conditions

Sometimes a starting condition may not work as intended, and you may want to take a closer look at the result of the condition. To evaluate the expression you've entered into the Condition field, first click it to activate it (this also activates the edit field at the top of the Task window), then press the Enter key on the keyboard while holding down the Option key. This displays the result of the condition. In the example below, the simple expression "Clock:Time" evaluates to the time of the day.



Command-click the check-mark, or press Command-Enter, to display the result of the condition formula while editing it.

When deciding if the result of the condition should cause the task to be started, TRAX only considers whether the result is "true" or "false". A result that is zero is considered to be "false", anything else is considered to be "true". Thus, the result shown above would be considered "true". Actually, since this is a continuously running clock, it will only be considered "false" for a hundredth of a second after midnight.

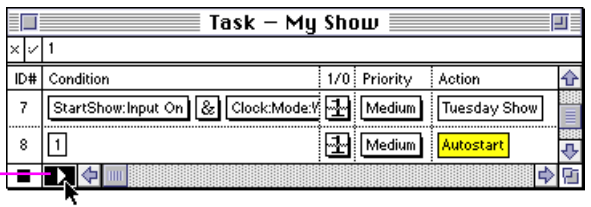
To make a useful condition based on a time value, like the one shown above, you would typically use one of the "greater than" or "less than" symbols on the

Symbol menu (see page 96). For example, the condition `Clock:Time > 7:00:00` will be considered "true" after 7:00 AM, and could be used to start a task once at 7:00 AM, assuming that its "1/0" pop-up menu is set to "Becomes True".

The more elaborate condition "`Clock:Time > 9:00:00 & Clock:Time < 17:00:00`" combined with "While True" will start the task repeatedly between 9:00 AM and 5:00 PM.

Running the Tasks

To activate the system run mode, click the play symbol in the lower left corner of the Task window. This causes TRAX to start scanning the list of Conditions, activating any tasks whose starting conditions are met.



Click the play symbol in the Task window to start running eligible tasks.

SHORTCUT: To activate the system run mode, you can also press Command-space bar from any non-modal window in TRAX.

When a task is started, its action field is highlighted. For timeline tasks, you can also see the timeline run if the timeline window is open.

While the system is running, you may switch to other TRAX windows already on the screen, or operate simulated panel devices through their status windows. You may not, however, open new windows, scroll windows, or give any other commands. Doing so will automatically terminate the system run mode.

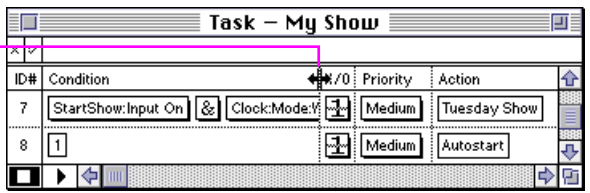
To run an individual timeline without running the entire system, open the timeline window and click its play button. See "Running the Timeline" on page 41 for more details.

- **HINT:** To activate the system run mode automatically when the show is opened, choose "Start Automatically when Opened" in the Preferences dialog box (see page 108).

Re-sizing the columns

The columns in the Task window can be resized by dragging the gray separator lines.

Drag here to re-size columns.



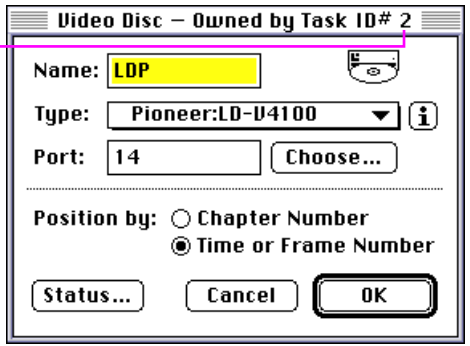
- **HINT:** To see long condition expressions, click on the task. This causes the condition to be displayed in the edit field at the top of the Task window.

Referring to Tasks by ID Number

Each task is identified by a number in the leftmost column of the Task window. This number unambiguously identifies the task as the owner of a particular device, or in error messages pertaining to the task.

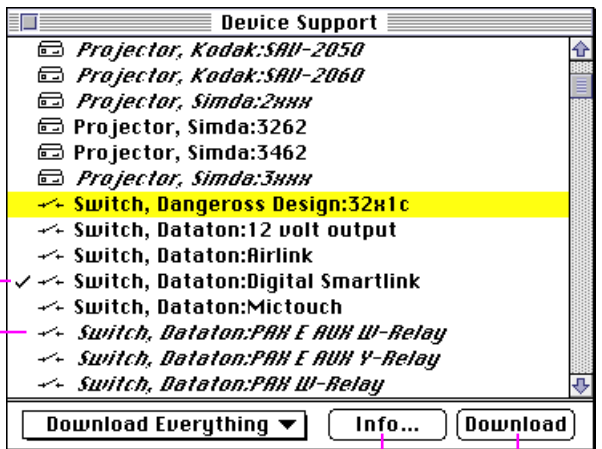
To see if a device is owned by a task, open the device's configuration dialog box by selecting it in the Device window and choosing Specifications on the Edit menu.

The ID number of the task that owns this device.



Device Support

The Device Support window contains a list of all the various brands and models of devices that can be controlled by TRAX. It also contains buttons to obtain information about selected devices and to download device support functions to SMARTPAX and other units. By downloading the appropriate device support functions to SMARTPAX you teach it how to talk to the devices. Once downloaded, the device support functions will remain in effect until you download again.



A device driver automatically chosen for downloading according to the current configuration of the devices in the Device window.

Devices shown in italics can not be chosen for downloading.

Display information about the highlighted device.

Downloads chosen device drivers.

The Device List

The devices are grouped under their various types, such as slide projectors and video disc players, as indicated by the icons to the left in the list. A corresponding list of devices is also available through the Type pop-up menu in each device's configuration dialog box (see "Device Type" on page 116).

A checkmark to the left of an item in the list means that it is chosen for downloading into a SMARTPAX control unit.

Items displayed in *italics* in the list are associated with the PAX control unit or other devices not directly controlled through SMARTPAX, and can not be chosen for downloading.

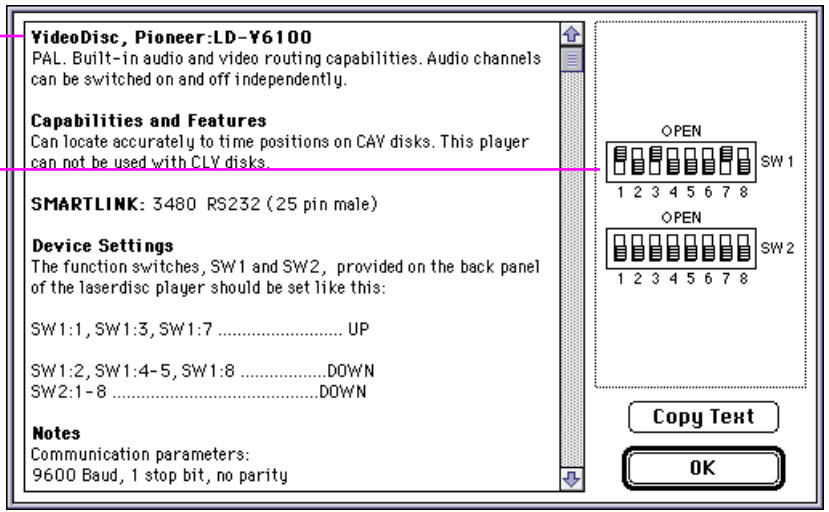
- **IMPORTANT:** Don't confuse merely selecting a device driver with choosing it for downloading. To select a device driver, simply click it with the mouse. Device drivers chosen for downloading into SMARTPAX are tagged with a checkmark to the left of its icon in the list. Drivers can be chosen automatically or manually, as described on the following pages.

Getting Information on Devices

To obtain information about a device, first select it in the list, then click the Help/Info button at the bottom of the window. The information displayed tells you, among other things, what cable you need to connect the SMARTPAX to the device to be controlled, how to set various mode switches on the device (if applicable), etc.

Device information database built into TRAX.

Hardware configuration of the device, such as DIP switches, special wiring, etc.


VideoDisc, Pioneer:LD-V6100
PAL. Built-in audio and video routing capabilities. Audio channels can be switched on and off independently.
Capabilities and Features
Can locate accurately to time positions on CAV disks. This player can not be used with CLV disks.
SMARTLINK: 3480 RS232 (25 pin male)
Device Settings
The function switches, SW1 and SW2, provided on the back panel of the laserdisc player should be set like this:
SW1:1, SW1:3, SW1:7 ..... UP
SW1:2, SW1:4-5, SW1:8 .....DOWN
SW2:1-8 .....DOWN
Notes
Communication parameters:
9600 Baud, 1 stop bit, no parity
OPEN
SW 1
1 2 3 4 5 6 7 8
OPEN
SW 2
1 2 3 4 5 6 7 8
Copy Text
OK

- **HINT:** The same information can also be obtained by clicking the "information" button in each device's configuration dialog box.

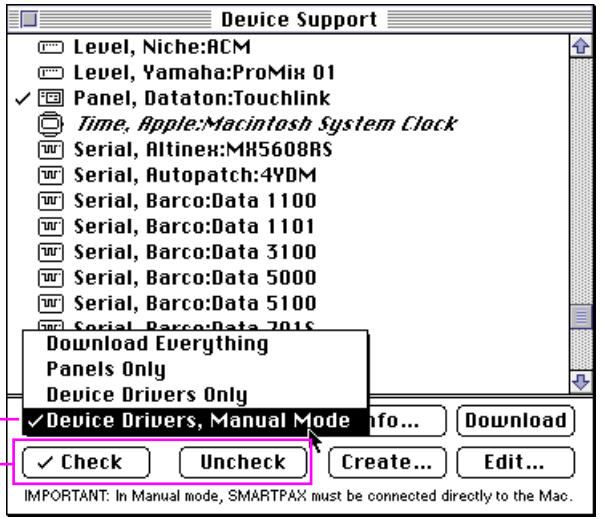
Automatic Device Selection

Device drivers chosen for downloading into SMARTPAX are tagged with a checkmark in the list. This choice can be made automatically or manually. To make TRAX choose device drivers automatically, select "Download Everything" or "Device Drivers Only" on the pop-up menu at the bottom of the window.

In the automatic mode, TRAX will choose all device drivers required for controlling the devices that are in the Device window, according to their configuration. This is appropriate when you already have a full complement of devices in the Device window. The devices must have been set up properly in their respective configuration dialog boxes.

Manual Device Selection

The manual selection mode is activated by choosing "Device Drivers, Manual Mode" from the pop-up menu at the bottom of the window.



Select "Device Drivers, Manual Mode" to choose device drivers manually.

Check or un-check highlighted device drivers using these buttons.

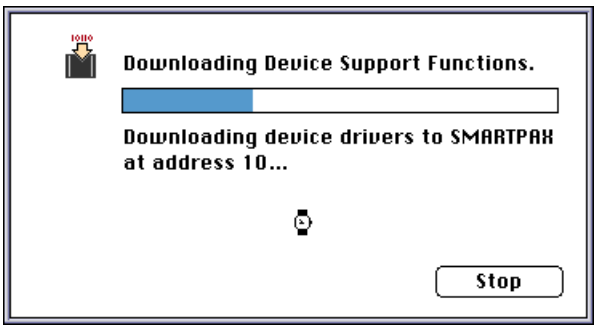
In this mode, you can manually choose which device drivers to download into SMARTPAX. A chosen driver is indicated by a check-mark. To choose a driver, first select it using the mouse then click the Check button at the bottom of the window. You can select multiple drivers by Shift-clicking them in the list before you click the Check button.

- **NOTES:** The Check and Uncheck buttons are only available in Manual Mode. Don't confuse merely selecting a driver with choosing it for downloading – only drivers tagged with a checkmark will be downloaded.

Downloading in Automatic Mode

Downloading in automatic mode is the most straightforward way of downloading device drivers. It allows you to download drivers into any number of SMARTPAX units while still having them connected as part of a complete system. To use the automatic mode, select "Download Everything" on the pop-up menu at the bottom of the window.

▼ **IMPORTANT:** Before clicking the Download button, make sure that all SMARTPAX units referred to by devices in the Device window are connected, powered and have their port addresses set properly.



TRAX first analyzes the system to make sure that all port addresses referred to by the devices are available (a warning will be displayed if TRAX can't find an address). TRAX then downloads all drivers required for each SMARTPAX, and assigns those drivers to their respective ports, based on the address specified for each port. Finally, TRAX also downloads any panel designs (see "Downloading Panel Designs" on page 70). To skip downloading of panel designs, select "Device Drivers Only" on the pop-up menu.

Downloading in Manual Mode

Sometimes you may just want to download a certain set of device drivers into a SMARTPAX, without first adding and configuring those devices in the Device window. This can be accomplished by selecting "Device Drivers, Manual Mode" on the pop-up menu at the bottom of the Device Support window.

▼ **IMPORTANT:** In manual mode, you can only download to a single SMARTPAX unit, which must be connected directly to the computer.

After downloading, you must configure each SMARTPAX port manually using the buttons on the front panel (see page 321).

Troubleshooting

Check these points if you run into problems while downloading:

- If downloading in automatic mode, make sure that all port addresses used by the devices in the Device window are available in the system. TRAX will tell you if it can't find a specific address.
- Ensure that all SMARTPAX units receive data from TRAX by checking the green DATA OK indicator on the front panel of each unit before you click the Download button.
- If you have selected the Interactive system mode in the Preferences dialog box (see "System Mode" on page 112), you can only have SMARTPAX units connected to the primary system bus. TRANSPAX+ or PAX must be on a secondary bus, routed through a SMARTPAX port using the appropriate driver (see the illustration on page 19).

- If you have selected the Interactive system mode in the Preferences dialog box, all SMARTPAX units must already have system software version 3.0 or later. This version number is shown briefly in the SMARTPAX display when powered up. If not, select "Backward Compatible" mode before downloading (see "System Mode" on page 112). As downloading also updates the system software in the SMARTPAX to the correct version, you only have to do this once.
- If downloading in manual mode, you must connect a single SMARTPAX unit only to the computer. If you have selected "Both" serial ports in the Preferences dialog box, then connect the SMARTPAX to the modem port, or else to the port selected in the Preferences dialog box.

Downloading Panel Designs

In addition to downloading device drivers to SMARTPAX, you can also download graphics, buttons, sound and other elements to one or many TOUCHLINK touch panels:

- Connect TOUCHLINK to the SMARTPAX port specified in its configuration dialog box.
- Open the Preferences dialog box (Command-K), and verify that the "Interactive" system mode is selected (see "System Mode" on page 112).
- Select "Download Everything" on the pop-up menu at the bottom of the Device Support window.
- Click the "Download" button.

TRAX will then download first all relevant SMARTPAX device drivers, and then the panel design. If you have multiple TOUCHLINK units in the system, it will download all of them.

- **NOTE:** The first time you download a new design to a TOUCHLINK, it may take several minutes. Subsequent downloads to the same unit, with only minor changes to the design, will be substantially faster.

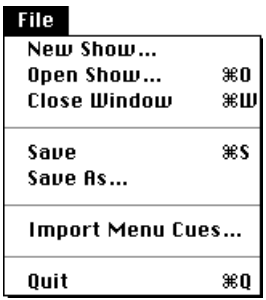
If you know that you have already downloaded all the right device drivers to the SMARTPAX units, you may instead choose "Panels Only" on the pop-up menu at the bottom of the Device Support window. This will download only your panel design changes, leaving the SMARTPAX units as they are.

Creating and Editing SMARTPAX Drivers

The two buttons in the bottom right corner of the Device Support window allow you to create and edit Serial device drivers. Such drivers can be used to control most devices equipped with some kind of serial data input (RS232, RS422, MIDI, etc.). This is useful if you need to control this kind of device when there is no standard driver available. Please refer to Chapter 10 for details on how to create such drivers.

- **NOTE:** These buttons are only visible when "Device Drivers, Manual Mode" is selected on the pop-up menu at the bottom of the Device Support window.

4 MENUS AND COMMANDS



This reference chapter describes all the menu-related commands in TRAX as well as the dialog boxes accessed through menu commands ending in an ellipsis (…).

The menus can be grouped into four kinds:

- The File menu provides standard, system-wide functions like saving and loading from disk, quitting the program, etc.
- The Edit and Object menus provide the commands used to manipulate the various objects. These commands operate on selected objects in the active window. The Edit menu contains standard editing commands, such as Cut and Paste, available in most Macintosh applications, while the Object menu contains more TRAX-specific commands such as Disable Device and Distribute Cues.
- The Device, Cue and Symbol menus are used to add new objects of those kinds to the active window. The appropriate window must be selected for these menus to become active, i.e., the Device menu is only active when the Device window is selected.
- The Window menu provides commands to show and control the appearance of the different windows as well as access to miscellaneous dialog boxes such as Preferences.

File Menu

TRAX can only have one show open at a time, so when choosing the New Show or Open Show commands you will be prompted to save any changes in the current show first.

New Show

This command lets you start programming a new show. When creating a new show you have the option of retaining the current set of devices and customized cues on the Cue menu.

Keep devices currently in the Device window.

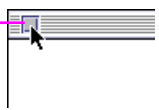
Keep any customized cues on the Cue menu.

Close Window

This command closes the active window. Clicking the close box located in the upper left corner of the window, or pressing Command-W, has the same effect.

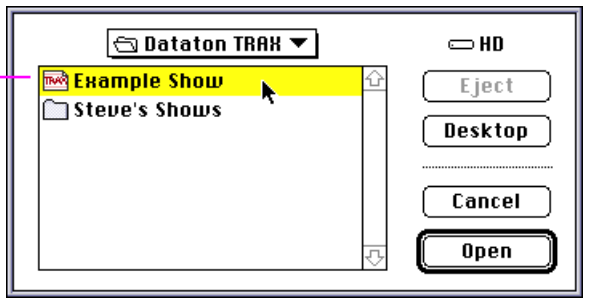
This doesn't remove the information displayed in the window from the computer's memory – it merely closes the window. See "Opening and Closing Windows" on page 20 for more details.

Close Box



Open Show

Opens an existing show. This will bring in all its devices, tasks, timelines, cues, etc. It will also open and position the windows exactly as they were when the show was last saved. If "Start Automatically when Opened" was selected when the show was saved, it will also be started automatically (see "Start Automatically when Opened" on page 108).



Chose a show file or a folder to open in the list.

Use the pop-up menu above the list to navigate to other disks and folders.

As TRAX can only have one show open at a time, the current show will be closed before opening the new one. If you have made any changes to the current show, you will be prompted to save those changes before opening the new show.

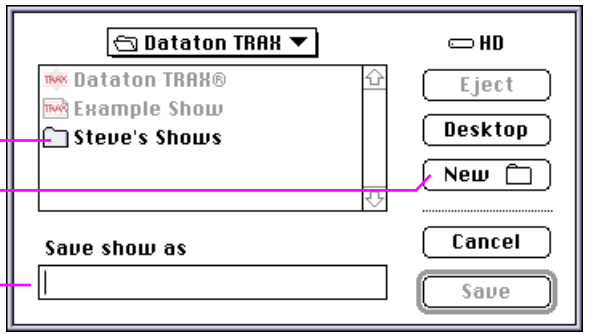
Save

Saves the entire show, including all the elements listed under Open Show on the opposite page. The first time you use the Save command, a dialog box prompts you for a name. Subsequent saves will save the show under this name.

Choose a folder to save into…

…or create a new folder.

Enter the name for the show here and click the Save button.



- **NOTE:** When saving a show, TRAX first writes to a temporary file named TRAX_TMP_xx with xx being a unique character combination. Once the save is completed, the original file is deleted and the temporary file re-named with the correct name. This two-tiered approach protects you in the unlikely event of a power failure or similar mishap during a save operation. In this case, the temporary file may be left on the disk and must be removed manually.

Save As

Saves the current show as a new show using another name. This new name will be used for subsequent saves. Use this command when you want to start making a new show based on an old one.

Import Menu Cues

Allows you to import customized menu cues from other shows. It imports only the customized cues on the Cue menu – not cues on timelines. If you want to import cues into a timeline window from another show, use the normal method of Copy and Paste.

A good way to use Import Menu Cues is to keep your favorite cues in a separate show file. You can then conveniently bring them into other shows whenever you need them. You can import cues from any number of show files. However, as there must be no duplicate names on the Cue menu, a dialog box will prompt you to choose between new and existing cues if there is a name conflict.

When importing cues, TRAX also attempts to import the original device assignment for those cues. For this to work, you must make sure that the relevant devices exist in the new show, and that they have the same names as in the show from which you're importing. If not, the cues will still be imported, although their device assignment will be lost. See the hint on page 180 for some more details.

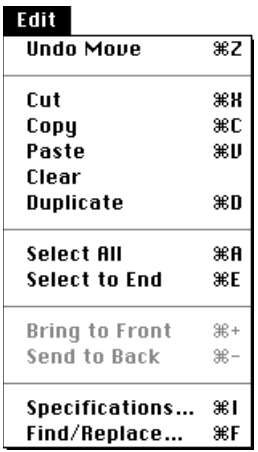
Quit

Ends your TRAX session and returns you to the Finder or other application. If there are any changes to the show, you will be prompted to save the show to disk before quitting.

Edit Menu

Use the commands on this menu to edit the contents of the currently selected window. It contains the same basic editing commands as found in most Mac OS applications.

Undo/Redo



The Undo command reverses the last editing change in the current window. The following operations can be undone: Cut, Paste, Clear, Create, Edit, Move, Duplicate.

Create refers to creating new cues, devices or other objects.

Edit refers to any changes done through the dialog box shown by double-clicking an object, editing a cue in list view, or changes to the device assignment of a cue or panel item.

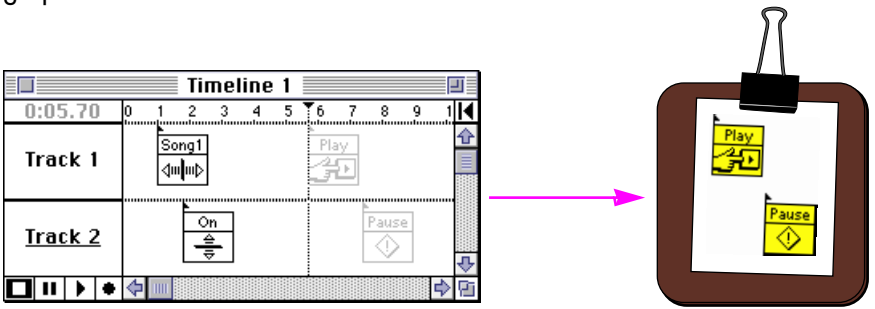
Undo Move will undo all kinds of moves including re-recording of cues and the effects of the Expand/Compress command.

When you undo something, the menu entry changes to Redo…, allowing you to undo the Undo command itself. There is only one level of undo.

You must choose Undo immediately after you edit, paste, move etc., and before you leave the current window. You can make a change, run the show to see what it looks like, and then undo the change.

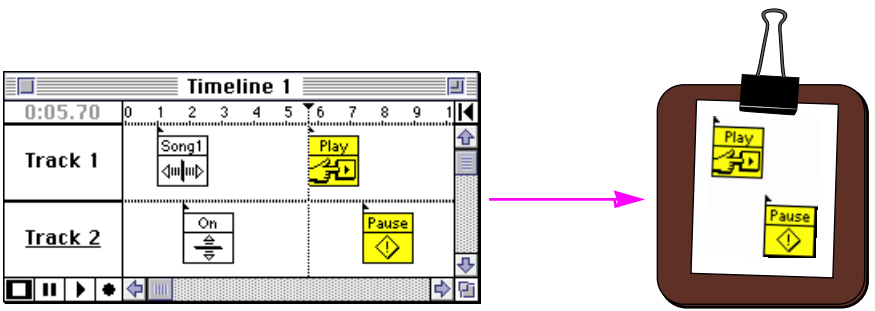
Cut

Removes the selected object or set of objects and places it on the Clipboard. This can be used on cues, devices, tasks and panel items, as well as text and graphics.



Copy

Copies the selected object or set of objects and places the copy on the Clipboard. The Clipboard holds only one set of objects from the most recent cut/copy operation – the next cut/copy will replace the contents of the Clipboard. From the Clipboard, the objects can be pasted to another place in the show, or into another show.

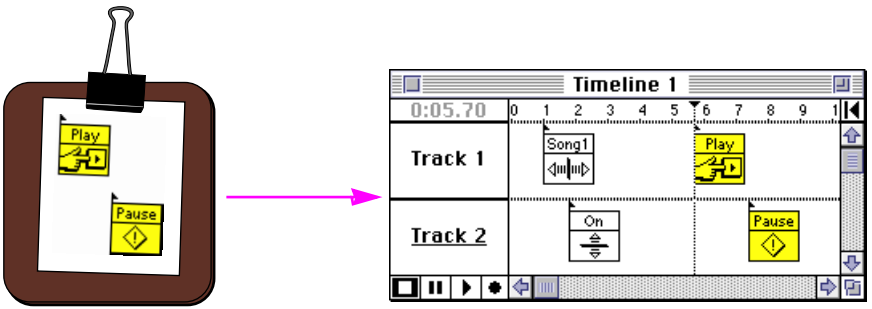


Paste

Pastes a copy of the contents of the Clipboard into the active window.

When you paste devices or panel items, they will enter the window at the original location of the object. So if you copy and then immediately paste, the copy will appear on top of the original. To see both the original and the copy, you must drag the copy to a new position in the window.

When you paste cues, they will be entered with the first pasted cue at the current time. When pasting a single cue, it will be entered on the current track. When pasting multiple cues, they will retain their original track positions.



Copying Between Shows

You can copy and paste objects within the same show or between shows. When pasting devices, TRAX will change the names and addresses of the pasted devices to avoid conflicts, if necessary.

When copying cues, tasks or panel items between shows, the names of the devices which they refer to must be identical in both shows. This is because TRAX uses the device names to correlate the device assignments. If the names are not identical, you can still paste the objects but you will then have to re-establish the device assignments manually.

▼ **CAUTION:** Be particularly careful when copying Fade cues with multiple faders between shows. If any devices referenced by the cues are not available in the new show, not only will you lose the device assignments for those devices but also their corresponding fader levels.

Using the Scrapbook

As an alternative to copying directly between shows, you can also use the Scrapbook under the Apple menu to hold the objects until needed. This allows you to build a library of useful device arrangements, cues or panel items for easy retrieval. When pasting objects into the Scrapbook, only their text representation will be shown – not their icons or other properties.

◆ **HINT:** For sets of cues, begin the set with a Note cue that says what the set does. You will then be able to see this note in the Scrapbook.

Clear

The Clear command removes the selected objects without placing the selection on the Clipboard. Use this command only when you have something more important on the Clipboard that you don't want to overwrite, as the Clipboard can only hold one set of objects at a time. Normally you should use the Cut command (Command-X) to remove objects.

- **SHORTCUT:** Pressing the backspace key usually has the same effect as choosing Clear on the Edit menu.

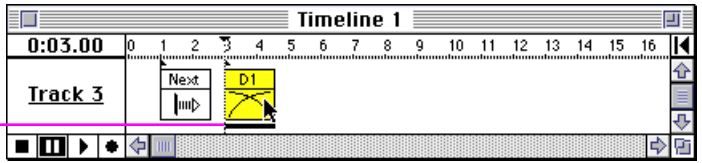
Duplicate

Duplicates the selected objects. This can be used on cues, devices, tasks and panel items. This command does not affect the Clipboard.

When duplicating devices, TRAX changes the name and port address of the duplicates to avoid conflicts.

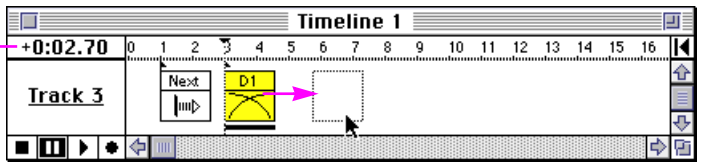
Duplicating Cues

When you duplicate cues, the new cues will end up on top of the original ones. This is indicated by the thick, black line underneath the cue.



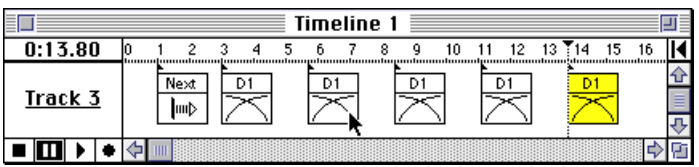
A cue on top of another is indicated by a thick line below the cues.

Drag the new cues the desired distance to the right).



Press the Option key while dragging to see the distance.

Subsequent Duplicate commands will now use this distance, allowing you to "step up" any number of cues at specific intervals.



Keyboard shortcut: Command-D.

Select All

Selects all objects in the active window.

▼ **WARNING:** This command literally selects all objects in the active window, even those currently off-screen.

Select to End

This command is available only while a timeline window is active. It selects all cues from the current time position to the end of the timeline.

This can be used to "insert time" in the middle of a timeline:

- Use the Select to End command.
- Drag the cues forward to open up some space for new cues.

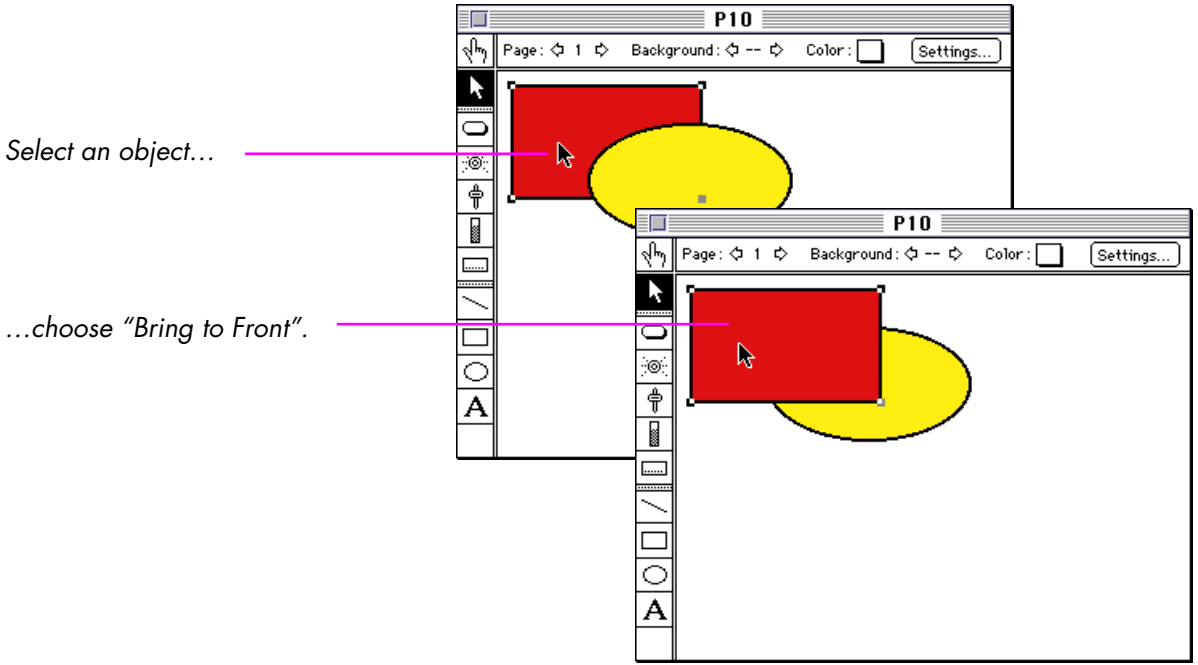
Specifications

Opens the selected object's dialog box, allowing you to see and edit its name and other characteristics. See chapters 5, 6 and 7 for detailed descriptions of all the dialog boxes related to devices, panel items and cues.

SHORTCUT: Double-clicking the object has the same effect as selecting an object and choosing Specifications. You can also use the Enter or Return keys to open a selected object's dialog box.

Bring to Front, Send to Back

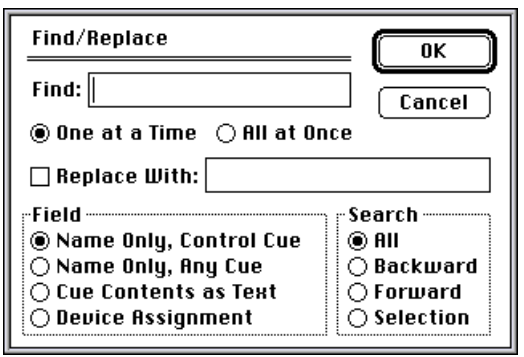
Use the "Bring to Front" and "Send to Back" commands to change the front-to-back ordering of layered objects, such as graphics on a panel.



Find/Replace

This command is only available when a timeline window is selected. It allows you to find and optionally replace various items using the same text form syntax as displayed in the List View.

By default, the Find command will search only the name field of Control cues. This allows Control cues to be used as labels to locate various points in a show. For example, if you're making an awards show you may have different show segments pre-programmed for the various possible winners. When the name of the winner is read out, you have to locate the appropriate show segment. By putting the various potential winner's names into the Name field of Control cues marking the beginning of each such segment, you can quickly locate the right segment simply by entering the person's name into the Find field.



Finding One at a Time

By default, the Find command will only find/replace the next occurrence. This is determined by the "One at a Time" radio button. When the Search option is set to All, TRAX will first search in the forward direction and then – if not found – it will search in the reverse direction.

Finding All at Once

Choosing "All at Once" will find and select all occurrences and then jump to the first selected cue. Use this to select a set of cues matching a search criteria when you want to copy, move or expand them, for example.

Search Extent

The Search radio buttons determine the extent of the Find/Replace command. If All is selected, all cues in the timeline will be searched. When Backward or Forward is selected, only cues in the past or ahead of the current time position will be searched. The Selection choice limits the search to the currently selected cues. This can be used as a way to apply multiple search criteria to a set of cues, for example first find all Dissolve cues using the "All" mode, then – from the result of that first Find command – find all cues referring to projector A5.

Field to Search in

The radio buttons in the Field area determine which part of the cue will be searched for a match. The default selection here is "Name Only, Control Cue", which is appropriate when using the Find command to locate named positions in a show. The Name Only, Any Cue radio button is similar but searches the Name field of any cue – not just Control cues. The name field is the topmost field in each cue's dialog box.

The "Cue Contents as Text" option searches all text in the Cue column of the list view, including the name. This allows you to search for dissolve rates, frame numbers, etc.

◆ **NOTE:** Although it is easiest to use the "Cue Contents as Text" option with list view activated, it will still work if you are in icon view mode.

Choosing "Device Assignment" causes the Find command to only look at the contents of the Device column in List View. This makes it easy to find all cues referring to a particular device. Again, this option is easiest to use with list view activated, but it works identically with list view turned off.

Replace With

The "Replace With" field allows you to replace the text found with any other text.

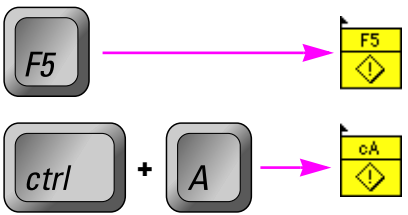
▼ **WARNING:** Use the Replace option with care! The safest way to use it is in conjunction with Search Selection to ensure that no unwanted side-effects occur.

As this command simply replaces one text string with another, its uses are unlimited. You can, for example, replace all Tray-Step Delays for a range of dissolve cues with another delay time, replace all references to one laserdisc player with another one. You can even work on partial items. For example, assume you name your slide projectors with a letter followed by a number, where the letter specifies the screen area. You can then transpose a set of cues referring to screen A to screen C simply by replacing A with C in the Device Assignment field.

Re-using the Last Find

Normally when you choose the Find/Replace command the dialog box comes up empty. However, sometimes it may be desirable to re-use the specifications of the last Find/Replace command, without having to re-enter all the details. Do this by holding down the Shift key while choosing the Find/Replace command (or press Command-Shift-F).

Using QuickFind



A special QuickFind feature, similar to the Find command described on the previous pages, allows you to search for Control cues in the current timeline window using a single keystroke. If you have a keyboard with function keys, you can use those for this purpose by entering "F1" through "F15" as names of Control cues. Pressing one of the assigned function keys will then instantly jump to that Control cue. Alternatively, you can use control key combinations by entering cA through cZ as Control cue names and pressing the letter while holding down the Control key.

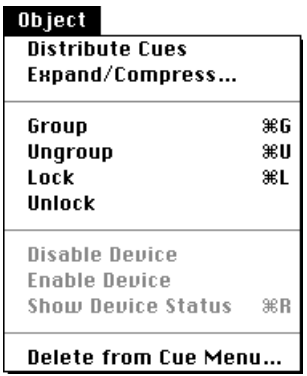
- **HINT:** Nine of the keys on the AIRLINK wireless remote control act as function keys F5 through F13. This can be used in conjunction with the Quick-Find feature to jump directly to specific points in the show (see Chapter 13 for details).

As this feature depends on function keys or control key combinations, it can not be used on Macintosh Plus, which doesn't have any of these keys.

Object Menu

This menu is similar to the Edit menu in that it allows you to manipulate the selected objects. However, while the Edit menu contains general commands such as Copy and Paste, the Object menu contains more TRAX-specific commands.

Distribute Cues



Distributes selected cues evenly along a timeline. That is, all selected cues (except the first and the last ones) will be moved so that the time between them is equally distributed. Use this, for example, when you want a certain number of actions to occur over a specific amount of time. After using this command you can manually fine-tune or re-record single cues, for example in order to match the sound track.

Distribute Cues can also be used when you want cues timed to go on the beat of the music for an extended period of time. First count the number of beats, then enter that many cues. Put the first and last cue on their respective beats, then use Distribute Cues to spread the remaining ones evenly.

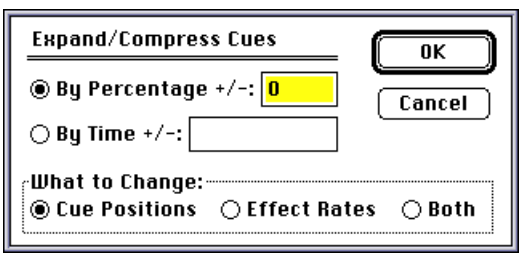
Expand/Compress Cues

Expands or compresses a range of cues along a timeline either by a percentage or a specific time. You must select at least two cues to use this command. Enter a positive percentage or time value to expand cues, or a negative value to compress them.

You can choose to change the cues' positions on the timeline, their internal effect rates, or both. The internal effect rate refers to any small time value, such as a dissolve or wipe rate, inside the cue's dialog box.

If you choose the Both radio button under What to Change, note that effect rates will always be changed proportionally to the expansion/compression factor (regardless of whether this is specified as a time or a percentage). Owing to the limited resolution of some effect rates, round-off errors may occur. Furthermore, if you compress a series of cues related to external timings not controlled by TRAX (such as the cycle time of a slide projector), the result may not exactly match your intentions. For example, there may not be enough time left after the compression to advance to the next slide.

If you choose to change Effect Rates and By Time, the time value will be added to or subtracted from the cue's effect rates. This can be used to decrease all dissolve rates in the selected cues by a specified amount.

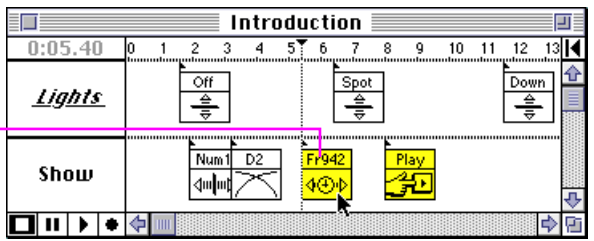


- **HINT:** You can offset the time positions in Locate Time cues using the Effect Rates option with By Time.

Group, Ungroup

The Group command lets you link several objects together to form a group. This command can be used with devices, cues and panel items (i.e., buttons, etc.). A set of cues may, for example, have been carefully arranged to perform a certain effect. Or you may want a Note cue to always stick to the cue whose function it describes.

Once you've grouped a number of items, they will always stick together when they are moved, copied, re-recorded or otherwise manipulated. When one object in the group is selected, all others are selected automatically.



Selecting any object in a group selects all group members.

You can also use grouping to form a group of mutually exclusive switch closure outputs. By doing so, TRAX will ensure that only one of the switches in the group is activated at a time. See "Output Mutually Exclusive in Group" on page 130 for more details.

Use the Ungroup command to break a group, making the objects individually accessible again.

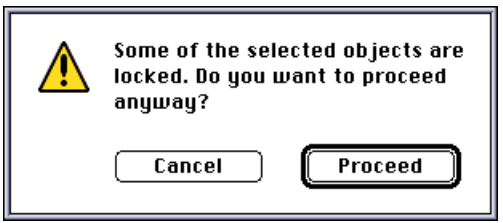
- **HINT:** You don't have to ungroup an object in order to edit its contents. Simply double-click it using the mouse. Once you finish editing the object, the other group members will automatically be re-selected again.

Lock, Unlock

These two commands are similar to the Group/Ungroup commands in that they allow you to protect selected objects. However, the Lock command is even stronger in that it won't let you make any changes at all to the locked object (unless you really insist, as described below).

A checkmark is displayed next to the Lock or Unlock menu commands if all selected objects are locked or unlocked.

Whenever you try to do anything that will affect a locked object, a warning is displayed:



You can then cancel the change before it is applied, or proceed if you want. This soft lock allows you to make any necessary changes without first unlocking the cue. Thus, you can lock a section of cues as soon as you're finished with them, while still being able to go back and make minor changes later on, if necessary.

Disable/Enable Device

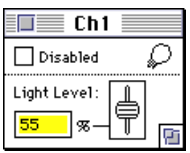
The icon for a disabled device.

Use Disable Device when you want to keep a device stationary while working on other devices or parts of the show. A disabled device will operate normally on the computer's monitor, but the physical device will remain as it was prior to disablement.

The disabled state indicated by these menu items is the same as the one shown by the Disabled checkbox in the status window for each device. Furthermore, the icons for disabled devices will appear crossed out in the device window.

▼ **CAUTION:** While it is possible and often convenient to select devices to be disabled or enabled from within a timeline window, be careful not to alter the device assignment of a cue! First click away from all cues to make sure that none will be affected by your device selection.

Show Device Status



Status window for a Lamp device.

This command opens the status window for the selected device. Use the status window to see the detailed status of a device, or to manipulate it manually. The status window can be left open on the screen while the show is run.

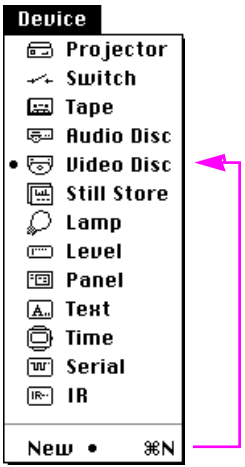
To open the status windows for a number of devices, first select all the desired devices in the Device window.

Please refer to Chapter 5 for a detailed description of the status window for each device.

Delete from Cue Menu

Allows you to delete customized cues from the Cue menu. A dialog box tells you to choose the cues to be deleted from the Cue menu. When you have finished deleting cues, click OK in the dialog box. Deleting cues from the menu has no effect on the cues in the show itself.

Device Menu



The "New" command creates a new device of the kind currently marked with a bullet.

Use this menu to add new devices to the Device window. See Chapter 5 for a description of each kind of device and associated windows.

- **NOTE:** The Device menu is only active when the Device window is selected. To activate the Device window, click its title bar.

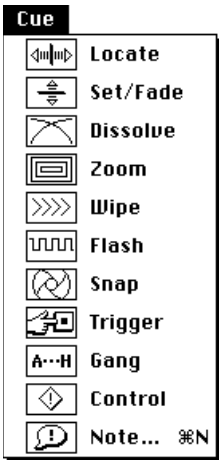
New devices are automatically given a unique port assignment and name. You can change any of these specifications, as well as other details particular to each kind of device by choosing Specifications from the Edit menu. However, you must make sure that the name and port assignment of each device is unique (the only exception here is the Switch device, whose port assignment may, in some cases, coincide with slide projector devices – see "Switch" on page 129 for details).

The "New" command at the bottom of the Device menu adds a new device of the kind last chosen from the menu, as indicated by a bullet to the left of the icon. In the example shown to the left, the New command will add another video disc.

The type, name, port assignment and other specifications for the device being created are based on the most recently edited device of the same kind. Thus, when creating multiple devices it's a good idea to start by creating the first one, and set all its specifications before creating the remaining ones. They will then be configured based on the first device's specifications.

An alternative way to add devices is to copy them from another show. See "Copying Between Shows" on page 80 for more details.

Cue Menu

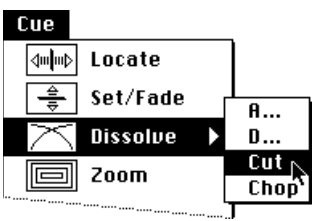


Use this menu to add cues to the current window. Cues tell the assigned devices what to do and when to do it. The *what* part is determined by the kind of cue chosen as well as its internal specifications. The *when* part is determined by the cue's position along the timeline or its starting condition in the task list. Cues must be assigned to one or more devices in order to have any effect. This is described in Chapter 7, where you'll also find a detailed description of each cue type and its various settings.

The Cue menu is only active when a timeline or the Task window is selected. New cues are entered at the current time and on the current track of a timeline (see "Creating Cues" on page 34). When entering a cue into the Task window, the cue will be entered as the action of a new task (see "Adding a Task" on page 51).

- **NOTE:** The Cue menu may look different on your Macintosh than in the illustration to the left. On Macintosh models without Color Quickdraw – such as Macintosh Plus, SE and some early PowerBook models – only the full height icons can be displayed. This may cause the Cue menu to be chopped off at the bottom.

Customized Cues

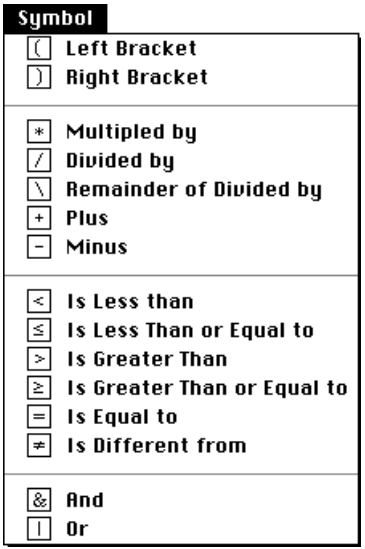


Customized Dissolve cues installed on the Cue menu.

In addition to the basic cues on the Cue menu, you can also create your own, customized cues. These cues will also appear on the Cue menu, and can be chosen either by selecting them from the menu, or by typing the name of the customized cue. Using customized cues speeds up the cue entry process considerably (see "To Menu" on page 180).

Instead of adding customized cues one by one, you can import them from other shows using the Import Menu Cues command on the File menu. Use the "Delete from Cue Menu" command on the Object menu to remove customized cues from the menu (see page 93).

Symbol Menu



Use the Symbol menu when entering starting conditions for tasks in the Task window (see "Specifying the Starting Condition for a Task" on page 53). The symbols can be used together with device status properties (both input and output properties) and constants to create mathematical expressions, very much as you would do in a spreadsheet or database program.

The symbols can be divided into three groups:

- Arithmetic symbols: `*`, `/`, `\`, + and –.
- Relational Symbols: `<`, `≤`, `>`, `≥`, = and ≠.
- Logical Symbols: `&` and `|`.

Of these, the relational and logical symbols are perhaps the most useful ones in task conditions. But the arithmetic operators can also come in handy from time to time. For example, assume you want a task to be started if the number of people in a room is more than 75 percent of a preset limit, then you could set up the condition like this:

```
Count:Numeric Position > Limit:Numeric Position * 0.75
```

where "Count" and "Limit" are two virtual stillstore devices used to keep track of the number of people in the room as well as the current limit. The limit value can be adjusted from a touch panel in the reception desk, and the counter driven by turnstiles at the entrance and exit doors.

Symbol Precedence

When combining multiple symbols to form an expression, some symbols take precedence over others. For example, in the expression

```
3 + 5 * 4
```

The multiplication is calculated before the addition. So the result of the above expression is 23 (5 times 4, and then add 3), not 32 as would have been the case if evaluated strictly left to right.

The precedence of the symbols is roughly equal to their order on the menu, although some symbols are actually at the same precedence level:

Highest:	*, /, \
	+, –
	<, ≤, >, ≥, =, ≠
	&
Lowest:	|

You can use parenthesis to override this built-in order of precedence, if desired. For example, if you would like the expression shown above to be evaluated as "add 3 and 5, then multiply the result by 5", you can write it like this:

```
(3 + 5) * 4
```

This means the addition will be performed before the multiplication, thereby achieving the desired order of evaluation.

If you're unsure about the result of an expression, you can try it out as described under "Evaluating Task Conditions" on page 59.

Arithmetic Symbols

The arithmetic symbols – multiplication, division, addition and subtraction of whole and fractional numbers – behave as you would expect. Note, however, that an expression involving only whole numbers always give a whole number as its result; for example `7 / 2` results in `3`. In order to obtain any fractional part of the result, at least one of the values must have a fractional part (even if it is zero); `7.0 / 2` results in `3.5`.

The "Remainder" symbol (backslash) gives the remainder of a whole number division, such as `7 / 2`. In this case, the result of the whole number division is `3`, with one left over. Thus `7 \ 2` equals `1`.

When used with time values, the type of the result varies with the kind of symbol and what's on the other side of the symbol:

`time * number`	The product, as a time; `1:50 * 2` equals `3:40.00`.
`time / number`	The quotient, as a time; `1:50 / 2` equals `0:55.00`.
`time + number`	The sum, as a time; `1:50 + 2` equals `1:52.00`.
`time – number`	The difference, as a time; `1:50 – 2` equals `1:48.00`.

When used with a numeric value to the left and a time to the right, the result is always the same as if a fractional number had been used on the right hand side, with the value equal to the number of seconds in the time value. That is, 3000 / 1:10.00 is the same as 3000 / 70.00, since 1 minute and 10 seconds equals 70 seconds.

When used with time values on both sides, the following combinations produce useful results:

`time / time`	The quotient, as a number; `3:30 / 1:00` equals `3.5`.
`time + time`	The sum, as a time; `1:50 + 1:50` equals `3:40.00`.
`time – time`	The difference, as a time; `3:40 – 1:50` equals `1:50.00`.

Type and Range of Values

When used with whole numbers, the maximal numeric range that can be handled is about +/– 2 billion.

When used with fractional numbers, TRAX truncates all values to two fractional digits, and the maximum range is about +/– 20 million.

All the symbols can be used with numeric as well as time values, although the results obtained by some combinations may not be very useful. The maximum time range that can be handled is –99:59:59.99 through 99:59:59.99 (that is, 99 hours, 59 minutes, 59 seconds and 99 hundredths). See the description of each symbol below for more details.

Relational Symbols

The relational symbols are often useful in starting conditions for tasks (see "Specifying the Starting Condition for a Task" on page 53). For example, you could use the ≥ symbol (is greater than or equal to) to start a task at 8:00 AM:

```
Clock:Time ≥ 8:00:00
```

This assumes that there is a Time device named "Clock" in the Device window, and that the starting condition variant "Becomes True" is selected for the task.

Expressions using relational symbols always produce a "true" or "false" result, where "true" is represented by 1 and "false" by 0. For example, the expression shown above would produce the numeric result 0 (i.e., "false") before 8:00 AM, and the result 1 ("true") after 8:00 AM.

When used in starting conditions for task, any non-zero result is considered "true", and zero is considered "false".

In general, you should use relational symbols to compare values of the same type; i.e., compare a time with another time. If you mix time and numeric values, the numeric value will be interpreted as seconds. For instance, the expression

```
Clock:Time ≥ 800
```

becomes true 13 minutes and 20 seconds past midnight, as 800 seconds equals 13 minutes and 20 seconds.

Logical Symbols

The logical symbols & and | are often used to combine several other sub-expressions using the relational symbols, for example. Logical symbols are sometimes called Boolean operators.

For example, if you want a task to run repeatedly while the time is between 8:00 AM and noon, you could do it like this:

```
Clock:Time > 8:00:00 & Clock:Time < 12:00:00
```

Here the "and" symbol is used to combine the results from the first sub-expression "`Clock:Time > 8:00:00`" with the second sub-expression "`Clock:Time < 12:00:00`".

- **NOTE:** While we humans might shorten a statement like the above to "The time is greater than 8:00:00 and less than 12:00:00", that doesn't work with computers. You must specify the `Clock:Time` reference explicitly as part of both sub-expressions.

Likewise, you can use the "or" symbol to start a task repeatedly if the time is either before 8:00 AM or after 5:00 PM:

```
Clock:Time < 8:00:00 | Clock:Time > 17:00:00
```

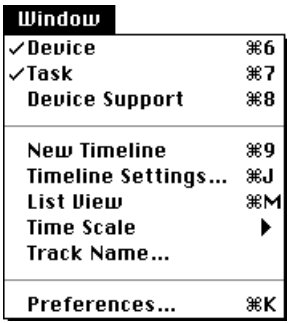
Both examples above assume that the starting condition variant "While True" is selected, which will keep re-starting the task repeatedly for as long as the condition is true, instead of running it just once when it becomes true.

You can combine the "And" and "Or" symbols in the same expression. But keep in mind that the "And" symbol has higher precedence than the "Or" symbol. You can override this using parenthesis, if desired.

Window Menu

The items on the Window menu control the visibility and appearance of the windows. If you look for a certain window and can't find it on the screen, this is the place to go. You can also get to some miscellaneous dialog boxes from this menu.

Device, Task, Device Support



These commands provide access to the three primary windows in TRAX. Choosing one of these commands opens the specified window or moves it to the front of other windows. A checkmark next to one of these items indicates that the window is already open. An underlined menu item indicates that the window currently is the active window.

Click the close box in the upper left corner of each window to close it.

Refer to Chapter 3 for a detailed description of each of these windows.

From within the three primary windows, you can open additional windows on objects contained within those windows. For instance, to open a timeline window associated with a task in the Task window, double-click the timeline's name in the task's Action column. Likewise, to open a window associated with a device, double-click the device's icon, or select the icon and use the "Specifications" or "Show Device Status" commands.

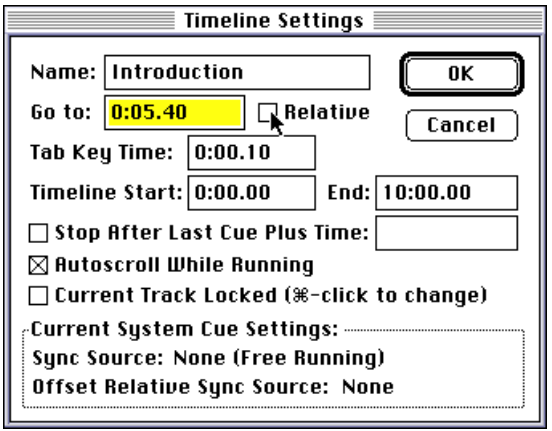
New Timeline

Creates a new timeline, adds it to the Task list, and displays its window. The timeline is created with a default name. Use the "Timeline Settings" command to rename the timeline (see page 103).

See "Timeline Window" on page 29 for more details.

Timeline Settings

Opens the dialog box for specifying the name and other details related to the currently active timeline window. This option is only active when the frontmost window is a timeline window. To change the settings for a timeline in the Task list, first open the timeline's window by double-clicking the timeline's name in the Action column of the Task list.



Go to

To jump to any time position along the timeline, enter the time value here and press Enter. To jump relative to the current time position, enter a positive or negative time value and select the Relative checkbox.

- **SHORTCUTS:** Typing a + or a – in a timeline window opens this dialog box, allowing you to type in a relative time. You can also double-click the numeric time readout in the timeline window to bring up this dialog box.

Tab Key Time

Pressing the Tab key while a timeline window is active moves you forward along the timeline by the amount specified in this field. Pressing Shift-Tab moves backward by the same amount. This is convenient if you often work with a particular amount of time, like the time corresponding to one video frame. Setting the Tab Amount to 0.04 allows you to move forward or backward one video frame at a time (assuming a PAL video rate, use 0.03 to approximate one NTSC frame).

You can nudge cues by the amount specified here by first selecting the cues and then pressing Command-Tab (moves forward) or Command-Shift-Tab (backwards).

Timeline Start/End

These fields determine the beginning and the end of the timeline. Normally the timeline starts at 0:00.00. However, if used with timecode from tape, you may want to offset the beginning of a timeline to match the starting time of the timecode.

The End field is initially set at ten minutes. It will be moved forward automatically by one minute if a cue is placed closer than fifteen seconds from the current end point. Pre-setting the end of the show before you start programming (assuming that you know the length of the final show in advance) keeps the display of the horizontal scroll bar along the bottom of the timeline window consistent throughout the production process, making it more useful as a time-of-show indicator. It is not possible to set the end point closer to the starting point than ten minutes.

Stop After Last Cue

Select this option to make the timeline stop automatically the specified amount of time after the last cue on a timeline. This causes the timeline to stop and relinquish control over the devices it has acquired. See "Stopping vs. Pausing a Timeline" on page 42 as well as "Device Ownership" on page 121 for more information on the relationship between tasks and devices.

Autoscroll While Running

If this option is selected, the timeline window will automatically scroll while the show runs, thus keeping the current time position centered in the window. If you're working on a large monitor – where you may be able to see a sufficiently long time span without scrolling – you may want to turn this option off.

Current Track Locked

This check box allows you to lock the current track selection. When not locked, the current track selection will change whenever you select a cue, just like the current time moves to the time of the cue. This is usually what you want when creating new cues. However, it can cause problems when using a track as a stop-track for speaker support applications. In this case, it's important that the same track stays selected all the time as it contains the cues at which TRAX will stop and wait for a new key-press from the speaker before proceeding. See "Speaker Support" on page 226 for more details.

Current Control Cue Settings

This area of the dialog box shows the status of two settings controlled by Control cues. You can't change these settings in this dialog – they're included for information purposes only. Use a Control cue to change these settings at the appropriate points along the timeline. Both these settings are related to synchronizing timelines to devices or other timelines. See "Control" on page 212 for more details.

Sync Source

The Sync Source field shows the currently selected synchronization source for the timeline. By default, this is set to "None (Free Running)". Using a Control cue – either on the timeline itself or in another task – you can change the sync source for a timeline at any point.

For example, you may want to start a timeline free running, and then – after starting to play a device – synchronize the timeline to that device. When you're about to stop playing the device, you may switch back to free running again.

A timeline can also be slaved to a master timeline, so that whenever the master timeline is re-positioned, the slaved timeline goes with it. This relationship must be established in the Control cue in the master timeline that starts the slaved timeline, and it can not be changed while the slaved timeline is running. See "Control" on page 212 for more details.

Offset Relative Sync Source

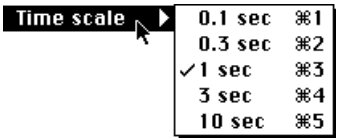
This time value – which can be positive or negative – is used when synchronizing a timeline to a device. Often, the time positions of the device and the timeline don't match. By specifying an offset in the Control cue that establishes the synchronization, you can compensate for this discrepancy. See "Control" on page 212 for more details.

List View

Choosing this menu item toggles the current timeline window between icon view and list view. In the icon view, each cue is shown as a box with a name and an icon representing the cue type, along a horizontal timeline. In list view, cues are displayed vertically, one line per cue, and all information is displayed as text.

The List View command is only available while a timeline window is selected. See "List View" on page 46 for more details.

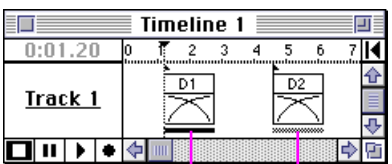
Time Scale



This menu item reveals a second menu that allows you to change the time scale of the current timeline window while in Icon View.

The standard time scale of one second gives you an overview of about twenty seconds. Choosing "3 sec" or "10 sec" gives a good overview but sacrifices detail and precision for dragging cues. Choosing 0.3 or 0.1 gives better precision and allows you to see cues that are close together, which might otherwise overlap too much.

- **SHORTCUT:** Regardless of the current time scale, you can always move the selected cues in 0.01 second steps using Command-right arrow or Command-left arrow (add the Shift key to move in 0.1 second steps). You can also move the cues by the current Tab value by pressing Command-Tab or Command-Shift-Tab (see "Tab Key Time" on page 104).



Cues on top of each other.

Cues almost on top of each other.

If two or more cues on the same track are very close together in time, you may not be able to see some of them in the 0.3 or higher Time Scale modes. This is indicated by a thick gray line below the cue icons. To see the cues underneath, zoom to a smaller Time Scale value or switch to List View.

A thick black line below the cue icons indicates that two or more cues are located at exactly the same time and track. In this case, it won't help to zoom in as they will still be on top of each other. You must move the topmost cue to another track or switch to List View in order to see each individual cue.

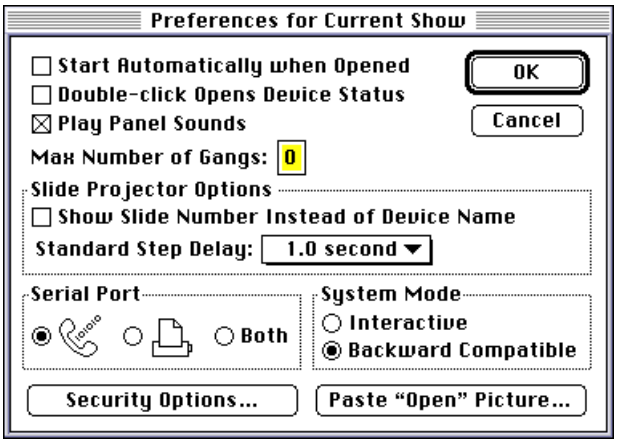
Track Name

This command brings up a dialog box allowing you to change the name of the current track. It is only available while a timeline window is selected. See "Tracks" on page 32 for more details.

Preferences

Brings up the Preferences dialog box, allowing you to specify miscellaneous settings. Note that these settings are stored with the show, and not in a separate preferences file. So if you bring your show to another computer it will retain all its preferences.

The disadvantage of this method is that some parameters, like the serial port selection, may differ on the other computer, although this is very unlikely (the printer port is typically used to talk to a printer or an AppleTalk network).



Start Automatically when Opened

Causes the show to start running automatically when it's loaded from disk. By placing the show (or an alias of it) in the Startup Items folder located in the System Folder of the startup disk, the show will be automatically loaded and started when the computer is turned on.

Double-click Opens Device Status

By default, double-clicking a device icon in the Device window opens its configuration dialog box. The configuration dialog box is used for the initial configuration of the device, but is then rarely accessed again. The configuration dialog box can also be opened by selecting the device's icon and choosing "Specifications" from the Edit menu.

In addition to that configuration dialog box, each device also has a status window. By selecting the "Double-click Opens Device Status" option, the status window will be opened instead of the configuration dialog box when the device icon is double-clicked. The status window can also be opened by selecting the device's icon and choosing "Show Device Status" from the Object menu.

- **HINT:** Pressing the Option key while double-clicking the device's icon temporarily reverses the double-click behavior.

Play Panel Sounds

By default, any sound attached to an indicator in a panel device will be played when that indicator is turned on and the panel's status window is selected. However, some computers may have problems playing sounds while keeping all other aspects of TRAX running without interruptions. If you run into problems that seem to be related to the playback of such sounds, you may want to turn off those sounds by un-checking the "Play Panel Sounds" option.

- **NOTE:** This option affects only the playback of sounds in simulated panels in TRAX. It does not affect the playback of sounds downloaded into TOUCHLINK panels.

Max Number of Gangs

The Gang setting determines the number of reserved gang addresses in the system. Gangs allow you to have multiple devices responding simultaneously to a cue. This is done by assigning those devices to a gang using the Gang cue, which essentially assigns them a second address. Later, when sending a cue to all members of that gang, TRAX optimizes this cue by sending it to the gang address instead of each device's individual address.

In order for this to work, some addresses must be set aside for use as gang addresses. When you reserve addresses for this purpose, they are allocated from the highest address (77) and downwards. These addresses can't be used by any device in the Device window. The maximum number of reserved Gang addresses is eight, corresponding to the eight gang letters shown at the bottom of the Device window when gangs are activated. See "Gang" on page 210 for details on how to program using gangs.

Slide Projector Options

The "Show Slide Number Instead of Device Name" checkbox displays the current slide number inside the icon of slide projectors in the Device window. This number is shown instead of the projector's name, which can often be deduced from its position in the window.

The "Standard Step Delay" option determines the delay used by slide projectors when advancing to the next slide following a Dissolve, Zoom or Wipe cue in which the "Delay After Light Out Til Tray Step" pop-up menu was set at Standard. Normally, you would set the Standard Tray Step Delay to the most suitable value for the kind of projectors you are using. As a general guideline, 1 second is suitable for projectors with low voltage 250 W lamps, for example the Kodak S-AV range. For projectors with high voltage lamps, like the Kodak Ektagraphic or Ektapro models, use 0.6 seconds.

However, depending on various factors, such as the slides themselves, the image size and the lighting conditions in the room, a shorter delay may be sufficient. This can be useful for very fast-paced shows that often need to get to the next slide very quickly.

Individual cues can override the standard step delay whenever required using the "Delay After Light Out Til Tray Step" pop-up menu in those cues.

Serial Port

Allows you to choose which serial port to use for communicating with the Dataton control units. Normally you would use the Modem port (the one indicated by a telephone symbol), but you may want to substitute the Printer port.

When you try to select a serial port in the Preferences dialog box, TRAX will check to see if that port is available. If not, an alert will be displayed telling you about the problem.

- **NOTE:** TRAX may say that there's no port available even though there is indeed one. In this case, the problem may be another program you've run before starting TRAX, which has used the serial port without closing it properly. Some background programs or system extensions, such as AppleTalk Remote Access (ARA) and some fax software may also cause such problems.

If the serial port appears to be in use by such a background program, TRAX gives you the option of "stealing" the port. Use this option with great care, as it may cause the other program and/or TRAX to fail.

Using Both Ports

Selecting Both ports makes it possible to control twice as many devices, as it doubles the addressing capacity of the system. It can also be used to divide the system into two buses for other reasons, such as controlling two floors in a museum from the same computer.

After selecting "Both", you can specify which serial port each device is attached to using the "Choose Port" button in each device's configuration dialog box (see "Port Assignment" on page 117).

System Mode

The System Mode options allow you to choose between "Backward Compatible" – for maximum compatibility with older Dataton control units, such as PAX and TRANSPAX+ – and "Interactive". The interactive mode unlocks all the interactive features, such as active inputs, multiple timecode sources, etc. See "System Modes" on page 16 for more details.

Paste "Open" Picture

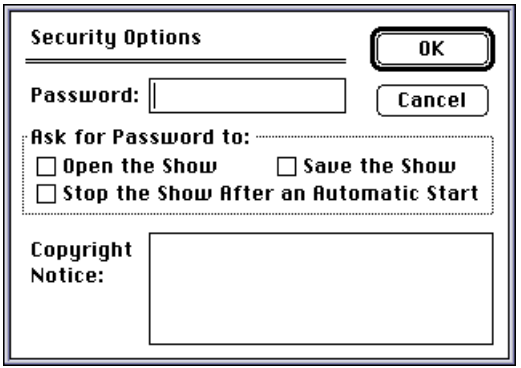
This button allows you to specify a picture – such as your company's logo – that will be included with all shows saved using your copy of TRAX. To use this feature, follow these steps:

- Copy the picture, such as your company's logo, possibly from another program.
- Click the "Paste Open Picture" button.
- Save the show as usual.

The next time that show is opened, your picture will be displayed.

Security Options

The Security Options button in the Preferences dialog box brings up the dialog box shown below. If your show is already protected by a password, you will be requested to enter it before you can access the Security Options dialog box.



Password

In order to use the password protection features, you must first enter a password into the Password field. The password can contain any combination of characters and punctuation. It is not case sensitive, meaning that the word "Chicago" and "chicago" could be used interchangeably.

▼ **IMPORTANT:** Remember to make a note of your password in a safe place. You will not be able to access the protected areas of your show if you forget it.

The password is local to the current show. Thus, individual shows may have their own passwords, if desired.

Ask for Password to...

The checkboxes in this area determine which areas of the show will be protected by a password.

- **NOTE:** The Security Options dialog box itself will always be protected as long as the password field is not empty, regardless of which other areas you have chosen to protect.

Open the Show. When selected, you will be asked to enter the password when opening the show.

Save the Show. When selected, you will be asked to enter the password when attempting to save the show. This can prevent unauthorized users from overwriting your show file by mistake.

Stop the Show After an Automatic Start. When selected in conjunction with the "Start Automatically when Opened" option in the main Preferences dialog box, you must enter the password in order to stop the show or access any other window on the screen. This only applies after opening the show file – not after starting it manually.

You would typically use this last option to create a "turn-key" installation, by putting the show file – or an alias to it – into the "Startup Items" folder, located in your System folder.

Copyright Notice

The message you enter here will be saved with the show, and displayed while opening that show.

If you select the "Ask for Password to Stop the Show After an Automatic Start" option (see above), your message will remain on the screen until the correct password is entered.

5 DEVICES

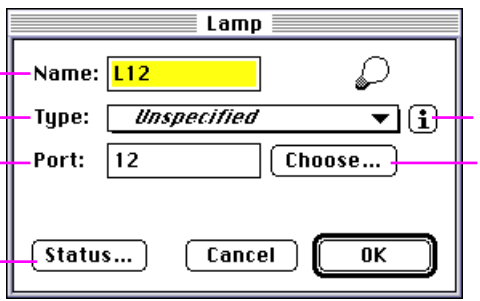
This chapter provides detailed descriptions of the various kinds of devices and their dialog boxes. Please refer to "Adding Devices" on page 23 for a description of how to create and manipulate the device icons in the Device window.

General Device Characteristics

General characteristics are similar for all devices, and include the name, type and port assignment. These attributes are specified in the device configuration dialog box, opened by selecting the device icon and choosing Specifications on the Edit menu. Each device must have a unique name and port assignment.

The name is used to identify the device internally in TRAX. If you make different shows using the same or similar set of devices, you should use the same names for the common devices in all your shows. This allows TRAX to correlate cues and other objects to the right devices if you copy objects from one show to another.

Device configuration dialog box.



Device name

Brand and model of device

Port assignment

Opens the device's status window

Information about chosen type.

Shows port assignment details.

Device Type

Use the Type pop-up menu to specify which brand and model of device is being used. This allows TRAX to automatically adapt its behavior to the requirements and specifications of the device. For example, once TRAX knows which slide projector model you are using, it will be able to precisely calculate the time it should take for the slide projector to become "ready" after a dissolve with automatic tray advance. Furthermore, some devices may have type-specific features which can't be accessed unless you've selected the right type of device.

In addition to informing TRAX on the device's particular details, your selection – together with the port address – is also used to determine which device drivers will be automatically downloaded into the SMARTPAX control units. This is done using the Download button in the Device Support window (see "Device Support" on page 63).

Device Information Database

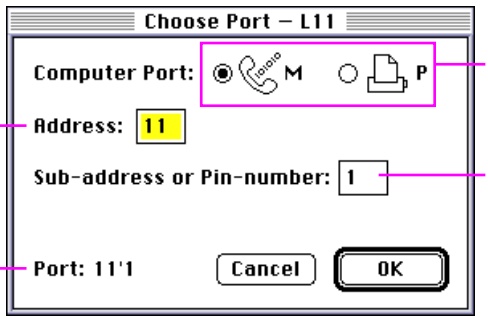
The "Information" button next to the Type pop-up menu provides access to additional information about the device, such as model-specific features or limitations, switch settings, programming hints, etc. This information can also be obtained using the Help/Info button in the Device Support window (see "Getting Information on Devices" on page 65).

Port Assignment

The port assignment associates the device icon with an output port on a SMARTPAX or other control unit.

When adding devices to the Device window, TRAX automatically assigns unique names and port assignments. You can change these by selecting the device and choosing Specifications on the Edit menu. However, you must make sure that the name and address remain unique. If not, a message will be displayed informing you about the conflict.

You can either type the port assignment directly into the Port field, or use the "Choose" button next to the field to enter it interactively.



Address assigned to the port using the buttons on the front panel of the SMARTPAX or other control unit.

Composite representation of the port assignment.

Only used if you've selected "Both" serial ports in the Preferences dialog box.

Sub-addresses are used for some types of devices.

Computer Port

When using both serial ports of the computer to communicate with the control units (see "Serial Port" on page 111), then you must specify which computer port this particular device is controlled through here.

You can ignore this field if you've chosen one serial port in the Preferences dialog box. If you then attempt to choose the other port, TRAX will accept your

new choice and remind you to activate “Both” ports in the Preferences dialog box.

Address

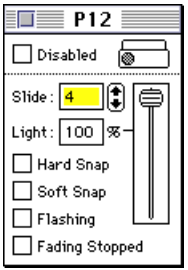
The entry in this field must match the address you have set for the output port on the SMARTPAX, or other control unit, to which the device is physically connected. An address is a number in the range 10 through 77, where no digit exceeds 7. See the chapters describing the control units later in this manual for details on how to set the addresses.

Sub-address

Some types of devices allow the use of sub-addresses. Sub-addresses are used, for example, to address individual output pins on the DIGITAL SMARTLINK, which provides 32 separate outputs. Although they all originate from the same port on a SMARTPAX, these signals may be used for very different purposes in your system. Hence, they are represented by individual devices in the Device window. All such devices associated with one SMARTPAX output port will have the same main address, but different sub-addresses.

Whether you can use sub-addresses or not depends on the particular brand and model of device, selected on the Type pop-up menu in the device’s configuration dialog box. When sub-addresses are allowed, TRAX will automatically append ‘1 to the Port field in the configuration dialog box. You may then change the sub-address to any allowable value. The actual number of sub-addresses handled by the device varies. TRAX will tell you if you enter a sub-address that is out of range. Only some Switch, Lamp and Level devices support sub-addresses.

Device Status Windows



Example of a status window for a slide projector.

See each individual device in this chapter for a description of its status window.

In addition to the configuration dialog box, each device also has an associated status window. You can open the device's status window using any of the following methods:

- Click the "Status" button in the device's configuration dialog box (see page 115).
- Select the device's icon in the Device window and choose "Show Device Status" on the Object menu (see page 93).
- Double-click the device's icon while holding down the Option key.
- Select "Double-click Opens Device Status" in the Preferences dialog box (see page 109), and then simply double-click the device's icon.

This status window shows the current status of the device, and allows you to change the status. It also displays far more detail than the icon representing the device in the Device window. For example, a slide projector icon will look the same whether the level has been faded to an intermediate value explicitly, or stopped by a Level Stop cue. Opening the status window for the device will reveal what has actually happened. This may be helpful when you don't understand why a device behaves as it does.

You can also use the status window as a remote control for the device by changing its status there. These changes remain in effect until you re-activate the timeline that owns the device (if any).

In order to change the status of a disabled device, you must first make sure the Disabled check box is unchecked. After making the changes, you can check the Disabled check box if desired. This forces your changes to remain in effect until the device is re-enabled.

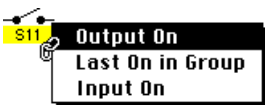
Disabled

The icon for a disabled device.

The Disabled check box in the device's status window allows you to temporarily disable the physical device. While disabled, the physical device will not be affected by any actions in your show, nor by any changes in the status window itself. This is useful if you want to work with only a few of the devices in your rig without disturbing – or being disturbed by – the others. Simply set the state of the device as desired, then click the Disabled check box. Note that the icon in the Device window, as well as the internal status displayed in the device's dialog box, will still update when you run the show, but the actual device won't be affected.

- **SHORTCUT:** As an alternative to the Disabled check box, you can also use the Disable Device command on the Object menu to disable multiple devices in one go (see page 93).

Device Status Linkage Menus



The device function linkage menu for a Switch device.

In addition to the status window – which allows you to see and manipulate the device's status – each device also has a pop-up menu for linking its status to tasks and panel items. This pop-up menu is displayed when you click the device in the Device window under these circumstances:

- You are editing a task's starting condition, in which case you can use the device's status as part of the starting condition expression (see "Linking Conditions to Device Status" on page 54).
- You are editing a panel layout, and have selected a single panel item, such as a Button or a Slider. This forms a two-way link between the panel item and the status property of the device, allowing either to control the other (see "Linking Panel Items to Device Status Properties" on page 160).

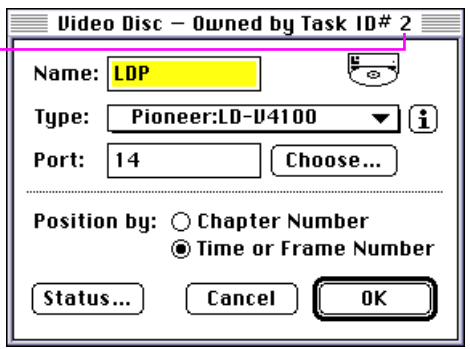
Device Ownership

As TRAX can have many tasks running at the same time, conflicts may occur whenever a task or timeline wants to use a device. If the device is already owned by another task, which has the same or higher priority than the new task trying to access it, the new task will not be granted access to the device. The device is said to be "owned" by the first task. See "Changing a Task's Priority" on page 52 for more details.

Thus, if a device doesn't respond to cues or other actions, you can see if it is already owned by some other task by opening the device's configuration dialog box. If the device is currently owned, that will be stated in the title bar of the device's configuration dialog.

The device in the example shown below is currently owned by Task ID# 2. To find out who that might be, you would then need to open the Task window and look up the task by its ID number. See "Referring to Tasks by ID Number" on page 62 for more details.

The ID number of the task that owns this device.

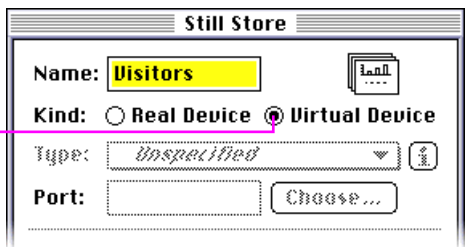


Virtual Devices

Some devices can be designated as "virtual" using a radio-button in their configuration dialog boxes. This includes the Switch, Level, Still Store, Text and Time devices. A virtual device works like a real device in most aspects, except it has no physical counterpart. Hence, it does not have an address, and is only used internally in TRAX.

These devices are used primarily together with Panel devices. Items on a panel must be assigned to a device function in order to become operational. In many cases, you can control a function of a device directly using a panel button or slider. But sometimes you may want the button to start a timeline or other task. In this case, you could use, for example, a virtual Switch device, as it is only used as a way to link the button to the task (see "Linking Conditions to Device Status" on page 54).

While this may seem overly complicated at first, this solution facilitates access to the same function from more than one page or panel – a definite advantage for large systems.

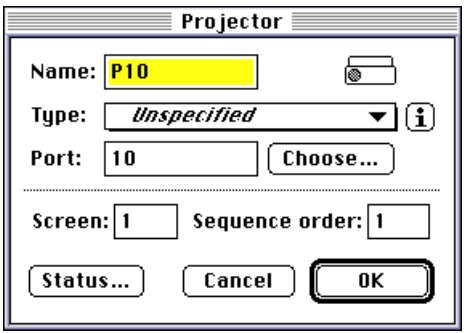


A virtual Still Store device used to count the number of visitors.

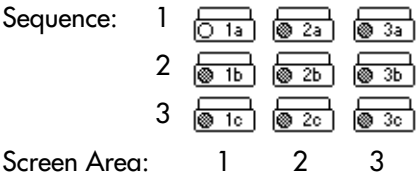
Slide Projector

Slide projectors are controlled either through SMARTPAX or PAX. You can mix both kinds of control units in the same system, but be aware that the lamps may respond differently in projectors with different types of lamps.

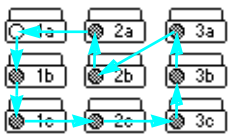
See Chapter 14 for further details on controlling slide projectors through PAX. Likewise, Chapter 11 discusses how to connect and configure projectors controlled through SMARTPAX.



Screen Area and Sequence Order



Using nine projectors on three screen areas.



Using nine projectors on one screen area.

In addition to the name and port assignment, a slide projector must also be designated a screen area number and a sequence order within that screen area. In large presentations, projectors are often grouped so that each group works on a separate part of a larger screen, or on a separate screen. The images from multiple projector groups on a large screen may be totally separate, edge-to-edge, or overlapping to create seamless panoramas.

All projectors on the same screen area should have the same area number. These area numbers are designated from left to right, so that the leftmost screen (from the audience's viewpoint) is number one; the next, number two and so on. This makes it possible for TRAX to automatically calculate horizontal effects, like a Wipe.

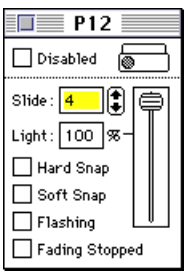
Within each screen area, the projectors themselves must be designated a sequence order number. TRAX uses this to calculate the order in which projectors ought to dissolve when a sequential mode is selected for a cue. When a single stack of projectors is used on a screen, the projectors are normally sequenced from top to bottom. I.e., the top projector is number one in the sequence order; the next is number two, etc.

When using more than one projector stack on the same screen area, try to sequence the projectors in a circular fashion. This minimizes the effect of keystoning (perspective distortion) when dissolving from one image to the next. Remember to take this into account when loading the slides into the trays.

Slide Projector Status Indication

- *Light Fully Off*
- *Light Fully On*
- *Light at Intermediate Level*
- *Projector Busy*
- *Flashing*
- *Hard Snap*
- *Soft Snap*

Status indicated by the device's icon in the Device window.



To see the full status of a projector, open its status window.

Some status information is indicated by the projector's icon in the Device window. The lens of the projector indicates the lamp, snap and busy status.

The Intermediate Level indicator will be shown when the projector lamp is at a level between fully on or off – as programmed by a Set/Fade cue – or when you've used a Fade Stop cue to stop any Fade, Dissolve, Wipe or Zoom before completion. As the indicator only shows the target level, it won't change during the course of a dissolve or fade effect.

The Busy status in the projector's icon in the Device window is shown whenever you make a dissolve, wipe or zoom effect that causes the projector lamp to go off and the tray to step forward. The busy indicator is shown as soon as the cue is executed and remains on until the tray has advanced to the next slide. The status indicator then changes to the normal Light Off state. The busy status time is an estimate calculated by adding the lamp-down rate, the tray-step delay and the cycle time of the projector – as determined by your choice on the device's Type pop-up menu. This calculation will only be correct when going from fully on without any interruptions.

Applying a Flash Start cue on the projector causes the Flashing status. When you've used a Flash Start cue on a projector, you must use a subsequent Flash Stop cue to turn off the flashing, or the projector will still be flashing the next time you turn its lamp on.

The Hard and Soft Snap states are controlled by Snap cues. They also remain in effect until explicitly turned off by a corresponding Snap Open cue. It is not possible to use Flashing and Soft Snap on a projector at the same time.

Slide

The Slide field indicates the current slide number in the range 0…80. The button to the right of the Slide field increases or decreases the value. TRAX assumes that the home position in the slide tray is zero.

- **NOTE:** If you're using straight tray projectors, there will be a one slide offset between the displayed and actual values as straight tray projectors start at slide number one.

Use a Locate cue to go to a slide (see page 186). The slide number can also be automatically advanced by the Dissolve, Zoom and Wipe cues.

Light

The Light field indicates the target value for the light level. This will usually match the current light level of the projector, but may differ if you've interrupted a fading with a Fade Stop cue, as indicated by the Fading Stopped check box. In this case, uncheck the check box to resume fading to the specified target level.

Use a Set/Fade cue to program a specific light level, or to suspend a fading (see page 190). The light level is also implicitly controlled by the Dissolve, Wipe and Zoom cues as part of these effects.

Using a Dissolve cue to fade the projector lamp results in a different fading curve compared to the Fade cue, as illustrated on page 197.

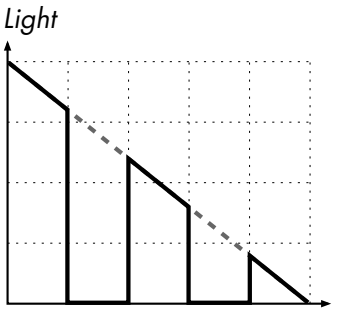
Hard Snap

This check box indicates that the mechanical shutter of the projector is closed. Use a Snap cue, set to Hard Snap, to control this function (see "Snap" on page 204).

- **NOTE:** Hard Snap can only be used with projectors that have a controllable shutter (snap), such as Kodak Ektapro models, Kodak Carousel S–AV 2030, 2050 and 2060, Simda and Elmo models. Specifically, it doesn't work with Kodak Ektagraphic models.

Soft Snap

Soft Snap is similar to Hard Snap, but is simulated by chopping off the power to the projector's lamp rather than closing a mechanical shutter. Thus, unlike the Hard Snap, this effect can be used with all kinds of slide projectors.



Using Soft Snap to create a flash-fade.

Any dissolve or fading in progress when the Soft Snap is performed will continue even though the lamp is turned off. Whenever you de-activate the Soft Snap, the lamp will resume its fading at the proper point. This can be used to create flash-fade and ripple-dissolve effects by using multiple Soft Snap cues set to Sequence. A similar effect can be obtained using the Flash cue, although the Soft Snap cue gives you greater control over the sequencing of the flash effect over multiple projectors. You can't use Flashing and Soft Snap at the same time on the same projector.

Use a Snap cue, set to Soft Snap, to control this function (see "Snap" on page 204).

Flashing

Flashing means that a Flash Start cue has been applied. When you've used a Flash Start cue on a projector, you must use a subsequent Flash Stop cue to turn off the flashing, or the projector will still be flashing the next time you turn its lamp on.

Fading Stopped

This indicates that a Fade Stop cue has been applied to the device. In this case, the Light field indicates the target level that would have been reached if the Fade Stop cue had not been used.

Use a Set/Fade cue set to "Stop" to program this function. See "Fading Stop/Resume" on page 191 for more details.

Status Pop-up Menu

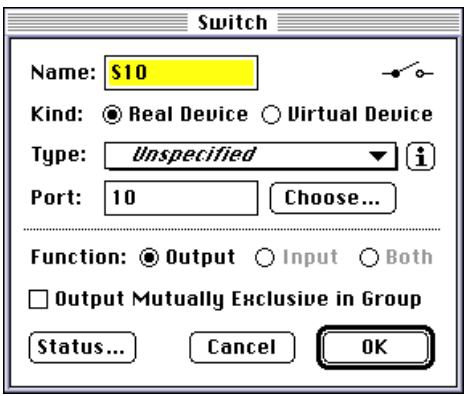
The following status properties are available for use in task triggering conditions and direct linkage to panel items (see "Device Status Linkage Menus" on page 120):

Light	*The current light level in percent.*
Slide	*The current slide number.*
Hard Snap	*1 if the mechanical shutter is closed, else 0.*
Soft Snap	*1 if the "soft" shutter is closed, else 0.*
Fading Stopped	*1 if fading stopped by a Level Stop cue, else 0.*

Switch

The switch device provides a basic on/off function. It can be used to control anything from a low voltage on/off output to mains voltage power relays. A switch device can also be an input to TRAX, providing input signals from sensors, push-buttons, MIDI keyboards or wireless remote control (see "AIRLINK" on page 346).

The DIGITAL SMARTLINK (see page 328) is the most common way to interface with basic switch closures. In this case, you can use up to 32 sub-addresses, corresponding to the 32 output and/or input signals available on that smart-link (see "Sub-address" on page 118).



Real vs. Virtual Switch Device

You can use a virtual switch device for example to link a button on a TOUCHLINK panel to a task in the Task list. You can also use it to keep track of some state of your system that can't be deduced from any other device status. This information can then be included in starting conditions for tasks (see "Conditions Based On Multiple Status Properties" on page 54).

Function: Output, Input, Both

Some types of switch devices can be used either as outputs or inputs, or both. This includes for example the DIGITAL SMARTLINK. These choices are made available as appropriate according to your selection on the Type pop-up menu.

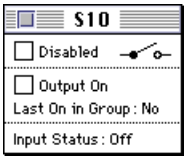
The input state of a switch is made available for use in task triggering conditions through the pop-up menu displayed when linking a task triggering conditions to the switch. See "Linking Conditions to Device Status" on page 54 for more details.

Output Mutually Exclusive in Group

This option allows you to specify that only one switch in a group of switches may be activated at a time. This is useful for example when controlling curtains or screens, where you must not activate both the "open" and "close" switch simultaneously.

To use this feature, open the configuration dialog box for each Switch device in the group and select "Output Mutually Exclusive in Group." Then select all the switches to be grouped in the Device window and choose Group on the Object menu (see "Group, Ungroup" on page 91). Now, whenever one of the switches in the group is activated, any other previously activated switch will be released automatically.

Status Window



Not activated
Last activated in group
Activated
Pulsed

Status indicated by the device's icon in the Device window.

The status window allows you to monitor the device's status, and to manually control the device (if applicable). Certain items in the status window may be inactive, depending on the settings in the device's configuration dialog box.

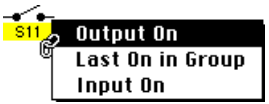
Output On. This check box indicates the output status of the switch. Click here to close the switch. Use a Trigger cue to program the switch (see "Switch" on page 206)

Last On In Group. This read-only status indicates whether this switch was the last one activated in a group of switches that all have "Mutually Exclusive in Group" selected (see page 130). It is sometimes useful to know which output in the group was most recently activated, since that will tell you whether, for example, a controlled curtain is open or closed.

Input Status. Shows whether the input of the switch is currently activated or not. This is only applicable if "Input" or "Both" is selected in the device's configuration dialog box (see page 130).

The icon in the Device window shows most of this information. However, if the switch is both an input and output, you will not be able to tell which function is activated simply by looking at the icon. In this case, open the status window to see all details.

Status Pop-up Menu



The following status properties are available for use in task triggering conditions and for direct linkage to panel items (see "Device Status Linkage Menus" on page 120):

Output On	*1 if the output is activated, else 0.*
Last On in Group	*1 if this output was last activated in a mutually exclusive group, else 0. This property is read-only.*
Input On	*1 if the input is activated. This property is read-only.*

Controlling PAX Relays

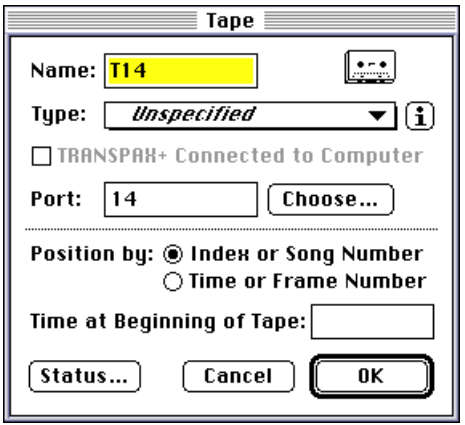
The switch device can also be used together with PAX for output-only functions. Each output on the PAX has two relays, called W and Y. You select these using the corresponding items on the Type menu in the switch device's configuration dialog box. Choose PAX W-Relay or PAX Y-Relay if the same PAX is also used to control projectors. If the PAX is only used for relay functions, set its OBJECT selector at E AUX and use the PAX E AUX items on the menu.

- **NOTE:** Relay addresses are assigned from right to left on the PAX, while projectors are assigned from left to right (front view). Thus you may have both a projector with address 10 and PAX relays with address 10 at the same time. This is the only exception to the rule that each device must have a unique address.

Refer to page 355 for further details on PAX.

Tape

This device handles audio as well as video tape. Click the Type pop-up menu in the device's configuration dialog box for a complete list of supported models. Chapter 11 discusses how to connect devices to SMARTPAX using the appropriate smartlink cable.



TRANSPAX+ Connected to Computer

This check box applies only to tape devices controlled through a TRANSPAX+ control unit, such as most open-reel tape decks, and is then only available when "Backward Compatible" is selected in the Preferences dialog box (see "System Mode" on page 112).

When checked, it allows the TRANSPAX+ to be connected directly to TRAX, on the primary system cable bus. This feature allows TRANSPAX+ to be used in a way similar to how it was used in version 1 and 2 of TRAX (see illustration on

page 17). Note, however, that this will not allow you to use the interactive features of TRAX.

The "Port" field can not be used if "TRANSPAX+ Connected to Computer" is selected, as the TRANSPAX+ itself doesn't have an address.

If this option isn't selected, TRANSPAX+ must be connected through a SMARTPAX port. See "System Modes" on page 16 for more details.

Position By

This option determines how to locate specific starting positions on the tape. Most professional tape devices allow you to locate a precise position using timecode or similar. Some DAT or DCC tape players may allow you to locate specific index or song numbers.

As very few tape devices can handle both these options, TRAX will usually be able to make the right selection here automatically, in which case the other option will become unavailable (grey).

If the selected model can't locate specific starting positions at all, both options will become unavailable.

Time at Beginning of Tape

This field lets you set the home position of the tape. This is useful if the tape has timecode that doesn't start at 0:00.00. In this case, enter the time corresponding to the beginning of the tape here. TRAX will then tell the tape to go to this time – rather than the nonexistent 0:00.00 time – whenever you reset the device to its home position.

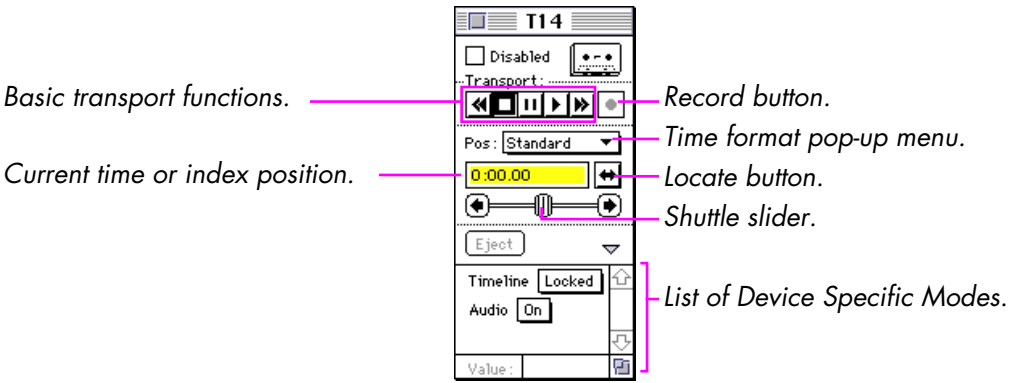
▼ **CAUTION:** If you don't enter the right starting time in this field, the tape may not be able to find its correct position, and will continue to search indefinitely.

Status Window

This symbol in the device's icon in the Device window indicates the current transport mode.

The five buttons at the top of the status window provide basic transport functions: rewind, stop, pause, play and fast forward. These functions can be used on all kinds of players, and are programmed using a Trigger cue (see "Transport" on page 207).

- **NOTE:** When "Position By Time or Frame Number" is selected in the device's configuration dialog box (see page 134), you can not use the Rewind and Fast Forward modes of the Trigger cue. Use a Locate cue instead to tell the tape where to go.



Record Button

This button activates the record mode of the device. To actually start recording, you have to click the play button. The record function is not available for all devices.

- **NOTE:** For devices controlled through TRANSPAX+, the record button also provides access to timecode and cue track recording. See Chapter 15 for more details.

The record function can be programmed using a Trigger cue. Note, however, that the Trigger cue will then start recording immediately when executed.

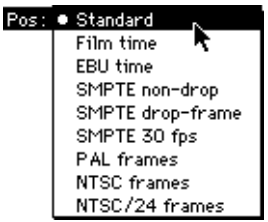
Position/Index

This field shows either the index number or the current time position of the tape, depending on the "Position By" setting in the configuration dialog box. You can also use this field to go to any position on the tape by entering it and clicking the locate button next to the field (or pressing Enter on the keyboard).

The format used to display and enter a time position is determined by the pop-up menu above the field (see "Time Formats" on page 137), which is only available if "Position By: Time or Frame Number" is selected in the device's configuration dialog box.

Use a Locate cue to program the position of the device (see page 186). If the device can locate arbitrary time or frame number positions then use "By Time", otherwise use "By Number", "Next" or "Previous". Some tape devices can't locate at all; see the device information for the selected type of device for details.

Time Formats



The time format pop-up menu determines the format used for displaying and entering time positions. This pop-up menu is only available when "Position By Time or Frame Number" is selected in the device's configuration dialog box (see page 134).

Standard. Time in hours, minutes, seconds and hundredths, displayed as HH:MM:SS.hh. This is the native TRAX time format – all times are internally stored with this resolution, regardless of the displayed format.

Film time (24 fps). Time in hours, minutes, seconds and frames, displayed as HH:MM:SS/FF. Twenty-four frames per second are normally used for movie films. It is also sometimes used on NTSC format laserdiscs transferred from film.

EBU time (25 fps). Time in hours, minutes, seconds and frames, displayed as HH:MM:SS/FF. Twenty-five frames per second is the standard video rate in countries using PAL or SECAM video systems. This format is sometimes referred to as SMPTE 25.

SMPTE non-drop. Time in hours, minutes, seconds and frames, displayed as HH:MM:SS/FF. Thirty frames per second is the standard video rate in countries using the NTSC video system. There are two versions of this format. The non-drop format is often used for non-broadcast applications.

SMPTE drop-frame. This is the second version of the SMPTE format. It is commonly used for broadcast applications, where the video time has to match real time. The reason for this is that the NTSC frame rate is actually 29.97 fps, and not exactly 30 fps. The drop-frame mode overcomes this discrepancy by "dropping frames" in the counting sequence.

SMPTE 30 fps. This format corresponds to "black-and-white NTSC", i.e., a frame rate of exactly 30 fps. It is sometimes used for non-TV applications.

PAL frames. Displays the position as a simple frame number, starting from frame number 1 and assuming a frame rate of 25 fps.

NTSC frames. Displays the position as a simple frame number, starting from frame number 1 and assuming a frame rate of 29.97 fps (i.e., standard color NTSC video).

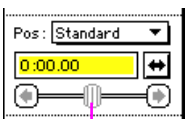
NTSC/24 frames. This format is sometimes used on NTSC laserdiscs originating from film.

◆ **NOTE:** Your choice of time format only affects the displayed value. TRAX calculates and stores all time positions with a resolution of 0.01 second, regardless of the display format.

Shuttle Slider

The arrows and the slider below the position field is used to single-step one frame at a time or to wind the tape in the direction you drag the slider. Not all players support this. Specifically, analog audio tape players and many simple video players can't do frame-by-frame stepping.

The shuttle control is useful when you're looking for a specific starting point. Similar controls are also available in the Locate cue, which is used to locate time positions on tape players equipped with this feature.



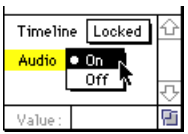
Shuttle slider grayed out.

▼ **IMPORTANT:** The operation of the shuttle slider, as well as the validity of the time displayed in the position field, depends on whether TRAX receives data from the device about its current position. If no data is forthcoming, the shuttle slider will be grayed out to indicate this. Furthermore, when using TRAX in its Backward Compatible mode, this indication is valid only while the status window is the active window.

Eject

This button lets you eject the tape or disc in the device. This feature is not supported for all devices. Use a Trigger cue to program this function (see "Eject" on page 209).

Device Specific Modes



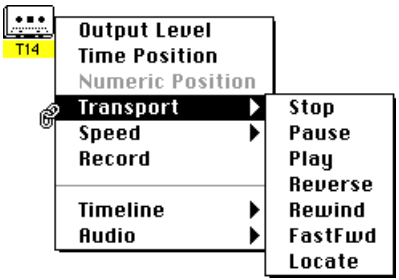
The list at the bottom of the status window shows the device-specific modes available for the selected type of device. Use the triangle above this list to show or hide the list. If the triangle appears grayed out, the chosen type of device doesn't have any such modes.

To change a mode, click on the box that indicates its current state and choose from the pop-up menu. Some states may take an additional numeric value, which can then be entered in the "Value" field at the bottom of the window.

Use a Trigger cue to program the device-specific modes (see "Device Specific Mode" on page 208).

For more information about the modes available for specific models, click the information button next to the Type pop-up menu in the device's configuration dialog box.

Status Pop-up Menu



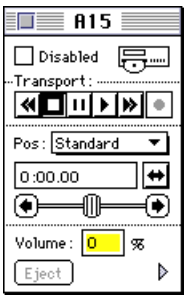
The following status properties are available for use in task triggering conditions and direct linkage to panel items (see "Device Status Linkage Menus" on page 120):

Output Level	*The current video and/or audio out level, as a number between 0 and 100.*
Time Position	*The current time position of the device, if applicable, as a time.*
Numeric Position	*The current numeric position of the device (i.e., song or index number), if applicable.*
Transport	*The current transport mode. The "Reverse" mode applies only to some video disc devices.*
Speed	*Playback speed. Applies only to some video disc devices.*
Record	*1 if currently recording, else 0.*
Device specific modes	*Device-specific modes are listed below the grey line. Their names and values vary with the type of the device.*

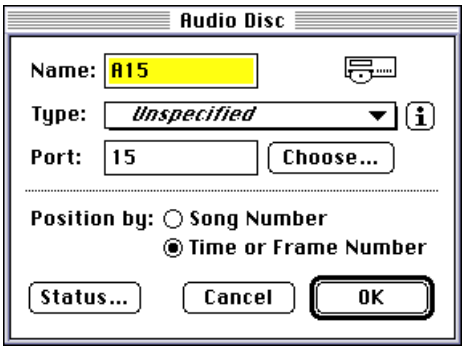
- **NOTE:** This set of status fields is shared among the Tape, Audio Disc and Video Disc devices. Some fields apply only to specific types of devices.

Audio Disc

This device handles audio discs of various kinds, including CD and minidisc devices. Click the Type pop-up menu in device's configuration dialog box for a complete list of supported models. Chapter 11 discusses how to connect devices to SMARTPAX using the appropriate smartlink cable.



Audio disc status window.



Please refer to the description of the Tape device, beginning on page 133, for general information on the configuration dialog box and status fields. See below for details specific to audio disc devices.

Position/Song Status Field

This field shows either the song number or the current time position of the disc, depending the "Position By" setting in the configuration dialog box. You can also use this field to go to any position on the disc by entering the position and clicking the locate button next to the field (or pressing Enter on the keyboard).

- **NOTE:** As there's no feedback from the device in "Position by: Song Number" mode, TRAX will not know when the disc moves on to the next song. It will simply display the number of the last song you've told it to locate.

The format used to display and enter a time position is determined by the pop-up menu above the field (see "Time Formats" on page 137), which is only available if "Position By: Time or Frame Number" is selected in the configuration dialog box for the device.

Use a Locate cue to program the position of the device. If the device can locate arbitrary time or frame number positions then use "By Time", else use "By Number", "Next" or "Previous" (see page 186). Some devices may not be able to locate at all. See the device information for the selected type of device for details.

Volume Status Field

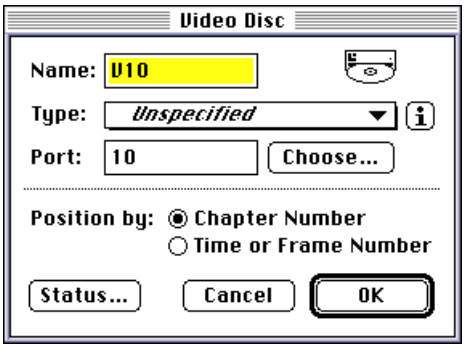
This field controls the level of sound. Use a Set/Fade cue to program this function (see page 190).

- **NOTE:** Many audio disc devices don't support this function.

Video Disc

Video disc status window.

This device handles video disc players such as laserdisc, CRV and hard-disk video systems. Click the Type pop-up menu in the device's configuration dialog box for a complete list of supported models. Chapter 11 discusses how to connect devices to SMARTPAX using the appropriate smartlink cable.



Please refer to the description of the Tape device, beginning on page 133, for general information on the configuration dialog box and status properties. See below for details specific to video disc devices.

Play Reverse

This button in the status window allows you to play the video backwards. Use a Trigger cue to program this function (see "Transport" on page 207). Whether this is actually possible depends on the selected model of player as well as the format of the disc used (see "Laserdisc Formats" on page 146).

Speed

The Speed pop-up menu controls the video playback speed in Play or Play Reverse mode. Most professional laserdisc players allow you to play slower or faster than normal speed. The speeds available depend on which model of

player you've selected on the Device pop-up menu as well as which type of disc is being used. Other restrictions may also apply. Check the device information for details.

Use the corresponding pop-up menu in the Trigger cue to select the speed in conjunction with the Play or Play reverse command (see "Transport" on page 207).

- **HINT:** The Speed pop-up menu in the device's status window shows the valid playback speeds for the device. Check here if the device doesn't respond properly to a speed you've specified in a Trigger cue.

Position/Chapter Status Field

This field shows either the chapter number or the current time position of the disc, depending on the setting of "Position By" in the configuration dialog box.

- **NOTE:** With some video disc players, it is not possible to automatically determine the correct setting for "Position By". This is due to the fact that these capabilities are also affected by the kind of disc being used (see "Laserdisc Formats" on page 146). Click the information button to the right of the Type pop-up menu for details on the selected model.

You can also use the Position/Chapter status field to go to any position on the disc by entering this position and clicking the locate button next to the field (or pressing the Enter key on the keyboard).

- **NOTE:** As there's no feedback from the device in "Position by: Chapter Number" mode, TRAX will not know if the disc moves on to the next chapter. It will simply display the number of the last chapter you've told it to locate.

The format used to display and enter a time position is determined by the pop-up menu above the field (see "Time Formats" on page 137), which is only

available if “Position By: Time or Frame Number” is selected in the device’s configuration dialog box.

Use a Locate cue to program the position of the device. If the device can locate arbitrary time or frame number positions then use “By Time”, else use “By Number”, “Next” or “Previous” (see page 186). Some devices may not be able to locate at all. See the device information for the selected type of device for details.

Video On

This check box in the status window allows you to turn the video output from the player on or off, if this function is supported by the player. This can be done explicitly using a Set cue or implicitly by selecting the appropriate check box in the Trigger and Locate cues (see “Output Control” on page 207 and “Turn Level Off” on page 189 respectively). When using a Set cue, set its Level to either 0 or 100% and the Rate to 0 (see page 191).

- **IMPORTANT:** The Video On checkbox controls the video output. This must be activated in order to see the video.

Laserdisc Formats

Just like video tape, video discs come in PAL and NTSC formats. In addition to these video standards, there are also two methods of storing the video onto the disc; CAV and CLV. Many players support both methods. The method used is usually stated on the disc.

CAV (Constant Angular Velocity). This is the preferred format as it provides access to all features of the laserdisc player. It's also faster than the CLV format when locating video frames.

CLV (Constant Linear Velocity). This is commonly used for discs intended for domestic use as it allows more video to be packed onto the disc . However, most players have a very limited set of capabilities when used with CLV discs. Common limitations are:

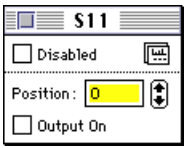
- Not able to locate exact frame numbers, only to the closest chapter, minute or second.
- Not able to show still images, or to sit at the located frame waiting for a Play cue before starting to play.
- Not able to play backwards or at other speeds than normal.

Some advanced players work around some of these limitations using digital signal processing techniques.

There are also two variants of frame numbering on NTSC discs. When transferring a movie onto an NTSC disc, some transfer houses retain the frame numbers from the movie. Thus, while the video frame rate is 29.97 fps the frame numbering scheme of the disc uses 24 frames per second. Use the NTSC/24 Frames or Film Time choices on the Time Format pop-up menu to obtain the corresponding readouts in TRAX.

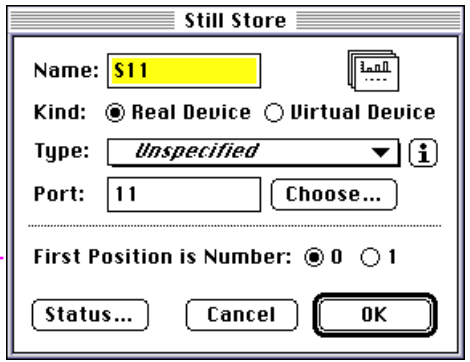
Still Store

This device provides control over most computer-based presentation programs as well as dedicated still-image presentation devices and lighting consoles. Chapter 11 discusses how to connect devices to SMARTPAX using the appropriate smartlink cable.



Status window.

Configuration dialog box.



First Position Is Number

This setting determines the number of the first position. Some devices consider the first position (e.g., picture, scene) to be number 1, while others consider it as number 0. This setting is usually configured automatically when a specific device is selected on the Type pop-up menu.

Status Pop-up Menu

The following status properties are available for use in task triggering conditions and direct linkage to panel items (see “Device Status Linkage Menus” on page 120):

Output Level	*100 if Output On is activated, else 0.*
Position	*The current position of the device, as a number.*

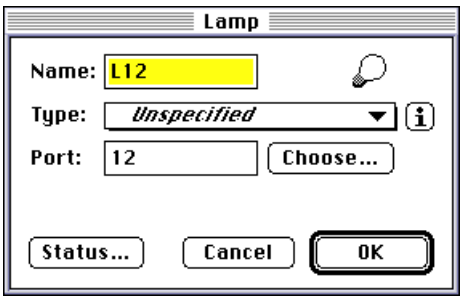
Lamp

Lamps are controlled using this device in either of two ways; using analog voltage or serial data. Analog voltage-controlled dimmers are often a suitable, low-cost solution for small to medium-sized lighting applications. Serial data, such as the standard DMX-512 and various other proprietary protocols are often used for larger applications. Analog dimmers are connected to the Dataton system through an ANALOG SMARTLINK, which provides a 0 to 10 V DC control signal suitable for most dimmers. Chapter 11 discusses how to connect devices to SMARTPAX.

Enlarge the window to increase the precision of the slider.

Status window.

Configuration dialog box.



The current lamp level is also indicated in the device's icon (blank when at 100%).

Most lamp devices allow the use of sub-addresses (see "Sub-address" on page 118). When using more than eight sub-addresses, TRAX reserves additional main addresses. This is indicated by a message appearing below the Port field.

Light Level

The lamp's brightness level is specified as a value between 0 and 100%. Use a Set/Fade cue to program this value (see page 190).

Stopped

A fading has been stopped by a "Fade: Stop" cue (see page 191). This feature is not supported for some lamp devices.

Level

The Level device basically provides the same functionality as the Lamp device, but contains some features which make it more appropriate for applications involving motion and sound control.

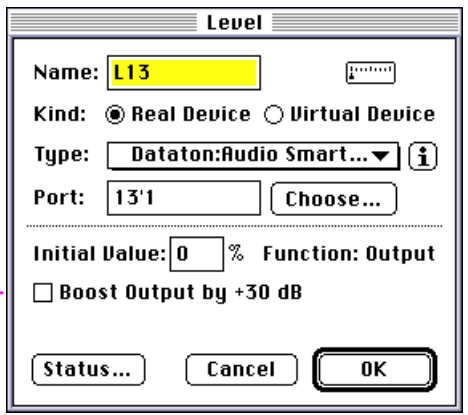
Just like the Lamp device, the output level is specified as a value between 0 and 100%. The current level is reflected by the indicator in the device's icon.

Some devices support enhanced resolution, allowing the level to be specified in steps of 0.01%. Check this in the device information by clicking the information button to the right of the Type pop-up menu.

Enlarge the window to increase the precision of the slider.

Status window.

Configuration dialog box.



The current level is also indicated in the device's icon.

Initial Value

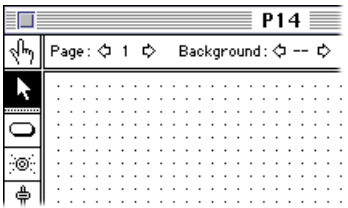
The initial value for the level. Used when the show is loaded from disc or when you apply a "Trigger: Reset" cue.

Boost Output

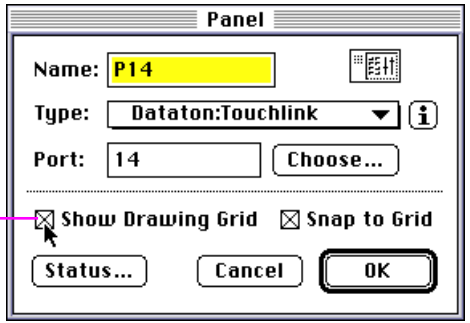
This boosts the maximum output volume by the specified number of decibels. It only applies to certain audio volume control devices.

Panel

A touch panel device can be used to add an end-user interface to your system. Please refer to Chapter 6 for full details on how to design and use panels.



Visible drawing grid in status window.



Show Drawing Grid

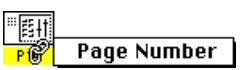
This option displays a drawing grid in the panel's status window and can be used as an aid in laying out the panel items. The drawing grid is not displayed on the real panel device – only in the status window.

Snap to Grid

This causes panel items to snap to the drawing grid, making it easy to align buttons and other items. Turn off this option for precise positioning of panel items.

- **HINT:** As an alternative to turning off "Snap to Grid," hold down the Option key while dragging the item.

Status Pop-up Menu

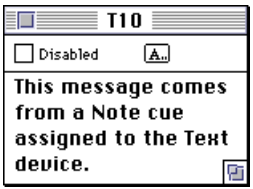


The current page number is available for use in task triggering conditions and direct linkage to panel items. You can, for example, link a button to the page number in order to go to a specific page when the button is pressed.

Text

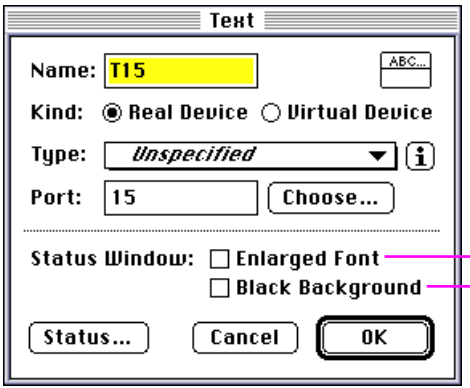
Use a Text device to display text messages in the device's status window, on a Panel device, or on an external device connected through a SMARTPAX such as a printer or LED sign. When this is used for on-screen messages only (e.g., operator notes), or for messages to be displayed on Panel devices, choose "Virtual Device" in the configuration dialog box.

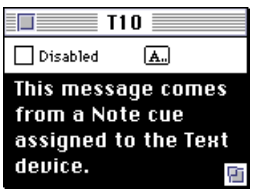
Use a Note cue to put text into a Text device (see page 218).



Status window.

Configuration dialog box.





Enlarged Font and Black Background

These check boxes allow you to change the font size and the background color of the status window for the Text device. This is useful, for example, if you use the status window as a prompter in a dark room.

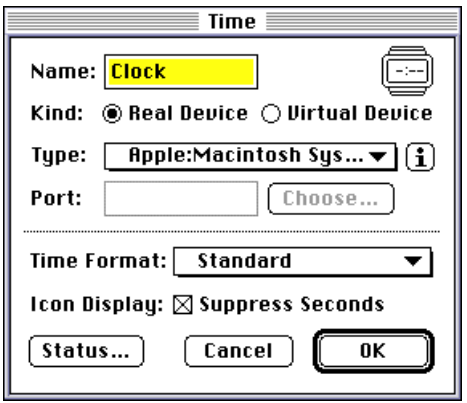
Status Pop-up Menu

You can use the status pop-up menu to link the text from a Text device to a Display field on a panel. This allows you to show text messages on the panel using Note cues. See "Display" on page 172 for more details.

Time

Use the Time device to obtain the current time of day, date, etc., for use in starting conditions for tasks or for display on a touch panel. Alternatively, use it for general purpose timer and countdown functions. When used with the appropriate device driver, the Time device will also allow you to bring in timing information from external sources.

Status window.



Configuration dialog box.

Time Format

Specifies the time format to be used in the status window and inside the icon in the Device window (see "Time Formats" on page 137).

Suppress Seconds

Select "Suppress Seconds" to display the time properly in the icon when the time may exceed one hour, such as when displaying the time of day. You may want to de-select this option if, for example, you use the Time device as a countdown timer. This affects only the way the time is displayed inside the icon. It doesn't affect the time value itself, or its display in the status window.

Time of Day Functions

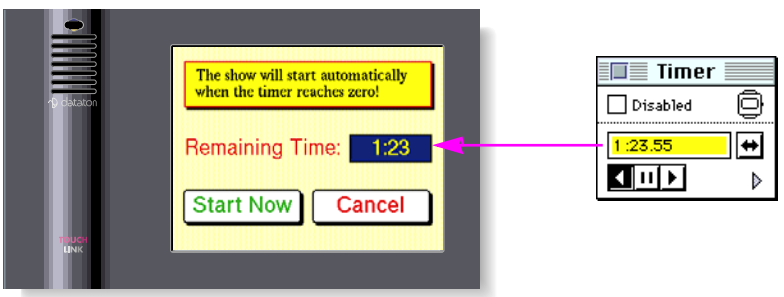
To use the Time device for obtaining time of day, day of week, etc., choose "Apple:Macintosh System Clock" on the Type pop-up menu. The values displayed in the status window will then be obtained from the clock built into your computer. The date, month, year, etc., are displayed as device-specific modes (see "Device Specific Modes" on page 139).

All properties are read only (i.e., you can't use cues to set or stop the time). You can still refer to all status properties in starting conditions for tasks and in panel items. You could, for example, display the time of day in a Display field on a panel (see "Display" on page 172).

Timer and Countdown Functions

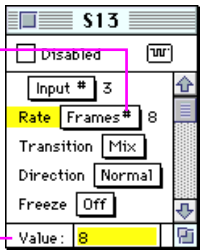
Select "Virtual Device" in the configuration dialog box to use the device for internal timer and countdown functions only. Then use a "Locate By Time" cue to set the time (see page 187), and use a Trigger cue to play the time forward or backwards (see page 207).

You can display the current value of the timer on a Panel device using a Display, Bar Graph or Indicator item.



Serial

This is a general purpose device, allowing you to control equipment fitted with an RS232, RS422, MIDI or similar control port. This could, for example, be a video projector, switcher or special effects device. The functions available are shown in the list in the status window, and are entirely determined by your selection on the Type pop-up menu in the configuration dialog box (see "Device Specific Modes" on page 139).

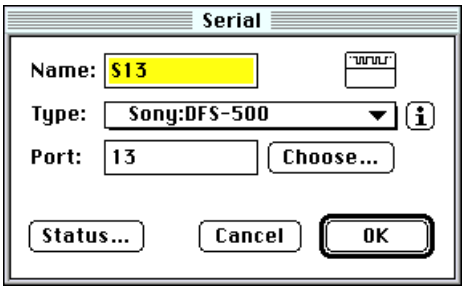


State with numeric value.

Device specific modes.

Value field.

Status window.



Configuration dialog box.

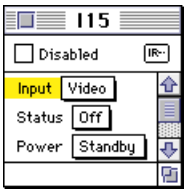
Some functions may take a numeric value, as indicated by a trailing number-sign on the pop-up menu in the list. In this case, the value field at the bottom of the status window becomes active, allowing you to enter the value.

Use a Trigger cue to program the device (see page 208).

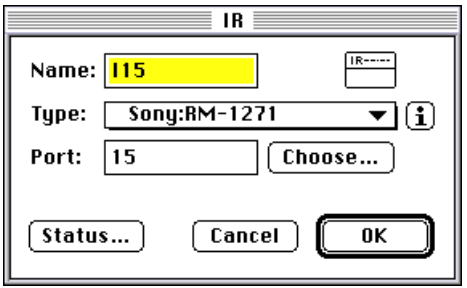
If desired, you can create a Serial device driver yourself, as described in Chapter 10.

IR

The IR device lets you drive most kinds of equipment that use infrared remote control by simulating the signals from the remote. Just like the Serial device, the functions available in the list in the status window are entirely determined by your selection on the Type pop-up menu in the configuration dialog box (see "Device Specific Modes" on page 139).



Status window.



Configuration dialog box.

Use a Trigger cue to program the device (see page 208).

If the device you need to control isn't available on the Type pop-up menu, please contact your Dataton dealer for information on how to obtain additional IR device drivers.

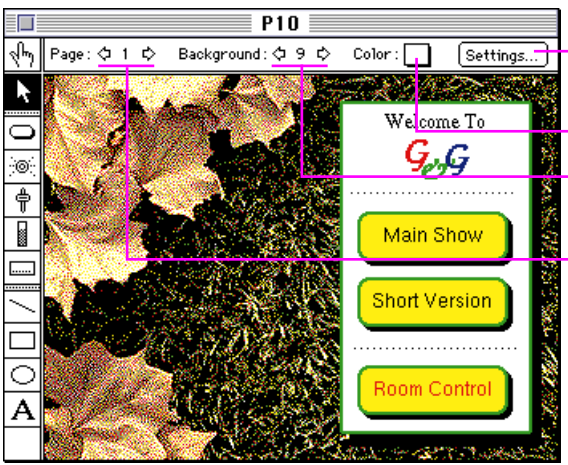
6 PANEL DESIGN

In this chapter you will learn how to employ Panel devices to create an attractive front end for your media control system. It tells you how to use text, graphics, sound, buttons and all the other tools provided in the panel window's tool bar.

Panel Status Window

Start by adding a Panel device to the Device window, or select any already existing panel device. Then choose "Show Device Status" on the Object menu to open the panel's window. The status window for the panel device doubles as its design and editing window. It also allows you to try out your design, either on its own, or in concert with all other functions in your show.

Hand: Try out the panel
Arrow: Edit panel items
Create Button
Create Indicator
Create Slider
Create Bar Graph
Create Display
Draw Line
Draw Frame
Draw Oval
Draw Static Text



Open the panel device's configuration dialog box.
Change the page's color.
Assign a background page to the current page.
Select a page to edit.

Pages

Each panel can have up to 99 pages. Each page can contain any number of buttons or other items. Use the Page arrows to move one page at a time in the desired direction. You can also use the following keyboard shortcuts:

Command-1	*Go to first page*
Command-2 or Left Arrow	*Go to previous page*
Command-3 or Right Arrow	*Go to next page*
Command-4	*Go to last page*

Click the page number to jump directly to a specific page. Likewise, you can jump to the background page – if any – by clicking the background page number (see "Background Pages" on page 159).

Use a Locate By Number cue (see page 187) to program a panel to go to a page from a task or a timeline. You can also use a button to go to a page by linking the button to the Page Number status property of the panel (see "Linking Panel Items to Device Status Properties" on page 160).

Drawing New Items

To draw a new item, first click the appropriate tool in the tool bar along the window's left edge, then drag diagonally across the page using the selected tool.

Editing Items

To edit existing items, first click the Arrow tool, then select the desired item. Items can be cut, pasted, duplicated, etc., as usual. They can also be grouped and locked using the corresponding commands on the Object menu. Use the "Send to Back" and "Bring to Front" commands on the Edit menu to change the layering of overlapping objects (see page 84).

Open a selected item's dialog box by choosing "Specifications" on the Object menu, or by double-clicking the item. The item's dialog box allows you to change its settings, such as its shape, color, text caption or action. See the description of each item in this chapter for details.

Colors

You can apply colors to all elements on panels, including the pages. To set the color of the current page, click the color swatch located next to the Settings button in the panel window. The page's color is used to fill all areas not covered by any panel items. This means that if you paste a large picture onto a page – as in the example on page 156 – you will not be able to see the page's color.

To color the various items, open the item's dialog box and choose from the swatches available for the various parts of the item. See the description of each item later in this chapter for more details.

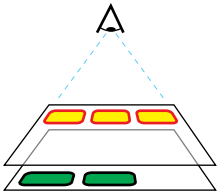
Kinds of Panel Items

There are two basic kinds of panel items; active and passive. These are divided by a dotted line in the tool bar. The active items are Button, Indicator, Slider, Bar Graph and Display. The passive items are Line, Frame, Oval, Text and Picture.

Overlapping Items

Passive items may overlap other passive items. Active items may overlap passive items. However, active items should not overlap each other, or be overlapped by passive items. Use the "Bring to Front" and "Send to Back" commands on the Object menu to control the front-to-back ordering of panel items.

Background Pages



Items on a background page, such as the two green buttons above, are also visible on other pages that uses that page as a background.

A page can be used as a background of another page. This allows items common to a number of pages to be entered only once, and then re-used by simply making all those pages refer to the same background page.

Of course, you could also copy and paste the same set of items across a number of pages. But by combining common items on a background page, there will be only one page to change should the need arise.

To create a background page, first use the Page arrows to go to an empty page. Then draw the items that will be common across a range of pages. Finally, go to the first of the pages that is to use the background page you have just created, and click the Background arrows to select the background page's number.

If you no longer want a page to have a background, then use the Background arrows to set the number equal to the foreground page number. This causes the background page number field to show "--", indicating that no background is used.

- **NOTES:** When using a background page, only its items will be shown on the page that uses it – not its color. All items from the background page will be drawn under the items that are on the page using the background. Active items from the background page may not be overlapped by items on the page using the background (see "Overlapping Items" on page 158).

Linking Panel Items to Device Status Properties

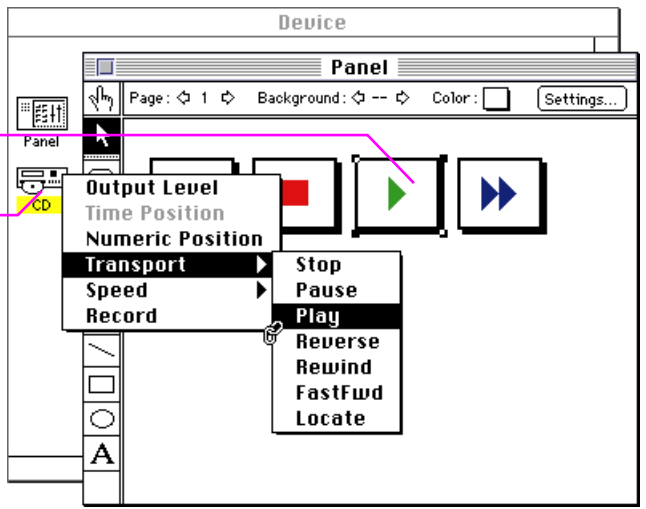
An active panel item must be linked to a device in order to do anything. Panel items are linked directly to individual status properties of devices. For example, a slider on a panel can be linked to the brightness of a lamp in a slide projector. Or a button on a panel can be linked to the play function of a CD player, causing it to play when the button is pressed.

Likewise, an Indicator, Bar Graph or Display item must be linked to the status property to be indicated. You may, for example, want an indicator to turn on when a tape deck moves past a certain position on the tape.

Linking a panel item to a device's status property:

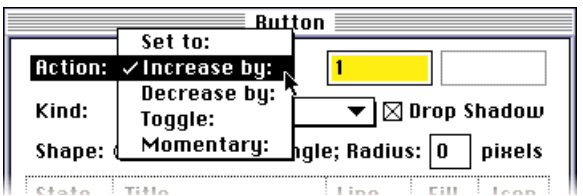
1. Select the panel item by clicking it using the arrow tool. Make sure only one item is selected.

2. Click on the device's icon in the Device window. This displays a pop-up menu, allowing you to choose a status property.



After linking an item to a device in this way, you can further specify how the item and the device relate to each other by double-clicking the panel item. Your options will vary depending on the kind of status property you linked the item to, as well as the kind of the item. In the example on the previous page, there are no options to set since the only thing you could possibly do to the Play status of a CD is to activate it. To stop the CD, use another button linked to Stop.

However, if you link a button to a numeric or time property – e.g. the song number of a CD, or the position of a laserdisc – you have more options as that property can take on a range of values. The illustration below shows the top part of the configuration dialog box for a button that has been linked to the song number of a CD player.



The Action pop-up menu lists all actions that can be applied to the status property to which the button has been linked. See “Action” on page 164 for more details.

- **IMPORTANT:** You must link the button to a status property *before* you can use the Action pop-up menu in the dialog box.

Status Indication

The button both controls and is controlled by the status property to which it is lin ked. Whenever the status changes, the button is automatically updated to reflect its new status. For example, a button controlling the play function of a tape deck will automatically light up whenever that device begins to play, even if the play command comes from elsewhere – such as from a cue on a timeline.

Priority of Panel Items vs. Tasks

The item-to-device link can only be used to control devices that are not owned by any task. However, the status indication discussed in the previous paragraph always works, regardless of whether the device is owned or not.

- **HINT:** If you need to control a device from a panel regardless of whether it's currently owned or not, you can do this indirectly through a task. Use a virtual Switch device to trigger the task (see "Virtual Devices" on page 122), then link the button to the virtual Switch instead. Set the priority of the task to "High," and put the action you want to be performed into the Action field of the task. This will allow you to take control of that device at any time, unless it's already owned by a high priority task.

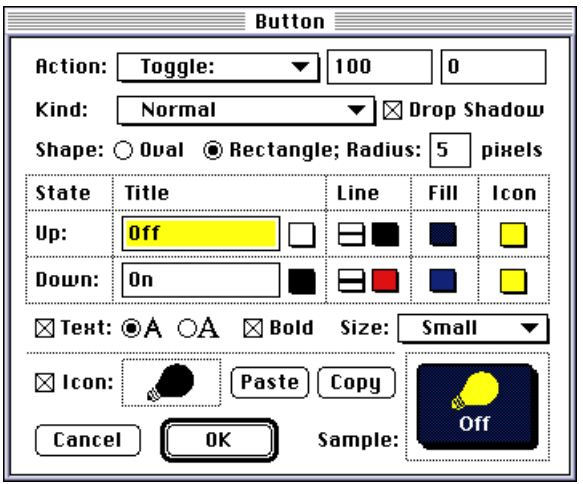
To Learn More About Interactivity

Please refer to Chapter 9 for more examples on how to use panels and other devices to create interactive presentations.

Button

The Button is the most basic kind of panel item. It can perform an action when pressed, such as starting a CD, setting the brightness of a lamp, or showing another page on the panel. Which action it performs depends on what kind of device status property it is assigned to, and how it is configured.

Open the configuration dialog box of the button by double-clicking it with the arrow tool.



Action

Use the Action pop-up menu to specify what should happen when the button is operated.

Set To. Sets the status property to the specified value when the button is pressed. The button will light up while the device is at the specified value.

Increase By. Increases the value of the status property by the specified amount for as long as the button is depressed.

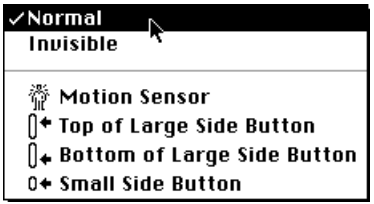
Decrease By. Decreases the value of the status property by the specified amount for as long as the button is depressed.

Toggle. Makes the status property toggle between the two stated values. The button lights up while the device is at the first specified value.

Momentary. When pressed, sets the value of the status property to the value specified in the first field. When released, sets it to the value specified in the second field. The button lights up while the device is at the first specified value.

- **IMPORTANT:** You must link the button to a device status property before you can use the Action pop-up menu (see page 160).

Kind



The Kind pop-up menu allows you to designate the button as a regular button or as a special button. These include invisible buttons used to create touch sensitive areas in pictures, the motion sensor and the side buttons.

Normal. A regular, visible button displayed on the panel. It is pressed by touching the button on the panel.

Invisible. An invisible button which can perform the same functions as a normal button, but doesn't show up on the panel. An invisible button is displayed in the panel's status window as a gray, crossed rectangle. It is not visible at all on the actual panel device. Use this when you want to make a picture or part of a picture touch-sensitive. by drawing an invisible button on top of the picture.

Motion Sensor. Represents the motion sensor built into TOUCHLINK. When the motion sensor is activated, this "button" will be pressed.

Side Buttons. Represents the three buttons on the right hand side of TOUCHLINK. Note that the large button is actually two buttons; the top and bottom of it can be programmed separately.

A button set to "Motion Sensor" or "…Side Button" can be attached to any function, just like a normal button. It shows up as an invisible button in the status window, allowing you to simulate its functionality by pressing it with the mouse. It doesn't show up on the real TOUCHLINK, nor does it respond if the user presses in that area of the screen.

Shape

Determines the shape of the button. Applies only when "Kind" is set to "Normal".

Oval. Makes round or oval buttons.

Rectangle. Makes rectangular buttons, with the specified corner radius.

Radius. Determines the corner radius of rectangular buttons, in pixels.

Drop Shadow. Adds a black drop shadow, a few pixels to the right and below the button. This distinguishes the button from other, passive items on the page.

Title, Line, Fill and Icon

There are two sets of Title, Line, Fill and Icon items in the dialog – one for when the button is "Up" and the other for when it is "Down". This allows you to make the button change colors or title when pressed.

The title field gives the button a name. To display its name inside the button, you must also select the "Text" checkbox. If desired, you can give the button a separate title for its "down" state, for example making it alternate between "On" and Off". If you don't put anything into the "Down" title field, the button will display the "Up" title in both states.

- **HINT:** It's often a better idea to use colors or line width instead of different texts to indicate that a button is activated. For example, if you alternate between ON and OFF texts, some users may think that the function will be turned ON by pressing the button labelled ON, while this in reality may indicate that the function is already on.

Text

The "Text" items allow you to specify the type and size of the font used for the text on the button, as well as to turn the text display off using the check-box. The color of the text is specified individually for the "up" and "down" states, as described above.

Icon

Selecting the "Icon" checkbox or clicking the dotted rectangle displays a list of ready-made icons. Select an icon in this list and click OK.

If possible, the icon will be shown above the text in the button. If there's not enough room above the text, the icon will instead be shown to the left of the text. If it won't fit there either, no icon will be shown. In this case, make the button large enough to show both the icon or the text, or turn off the text display using the Text checkbox.

You can also copy icons and small pictures from other programs, or make your own using a drawing or paint program. Icons can be up to 32 pixels high and 56 pixels wide. To transfer an icon or small picture from another program, copy it from the other program then click the Paste button next to the dotted rectangle. If the picture you attempt to paste is too big, it will be scaled to fit within the maximum size.

The icon can be colorized differently for the "Up" and "Down" states of the button using the Icon color pop-up menus.

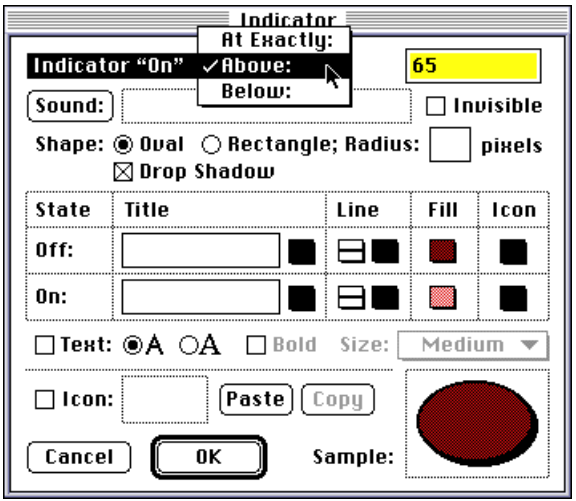
Sample

To see the button as it looks in its "down" state without closing the dialog box, click the Sample button using the mouse. This only shows the visual appearance of the button – it doesn't perform its action. When using a large font for the text in conjunction with an icon, the sample button may not accurately reflect what the real button will look like. You can move the dialog box to the side so you can see the real button with its actual size.

Indicator

An indicator is similar to a button in that it has two states, called Off and On. However, it doesn't affect the status property it's linked to – it merely indicates its state.

Most fields in the dialog box are similar to those in the Button dialog box described on the previous pages.



Indicator "On"

Depending on what kind of status field you have linked the indicator to, you can specify when it should indicate "on" and "off" using the pop-up menu and the value field.

- **IMPORTANT:** You must link the indicator to a device status property before you can use the "Indicator On" pop-up menu (see page 160).

Sound

The Sound button allows you to attach a sound to the indicator. A sound attached to an indicator will be played when that indicator is turned on. The Sound button brings up a list of all sound files available in the same folder as your show file and in your TRAX folder. Only System 7 and AIFF sound file formats can be used. The sound file must remain in the same folder as the show file or in the TRAX folder in order to play and download properly.

- **NOTE:** TRAX will only play the sound when the status window of the originating panel is the active window. This is to avoid confusion as you may have any number of panel status windows open on the screen, each with its own sounds. Furthermore, all panel sounds can be turned off in the Preferences dialog box (see "Play Panel Sounds" on page 109).

Invisible

If you just want the sound, and not the visible indicator, you can create an invisible indicator and attach it to the function that is to be indicated by the sound. Such an indicator will show up in the panel's status window as a gray, crossed rectangle, but will not be visible at all on the real panel device.

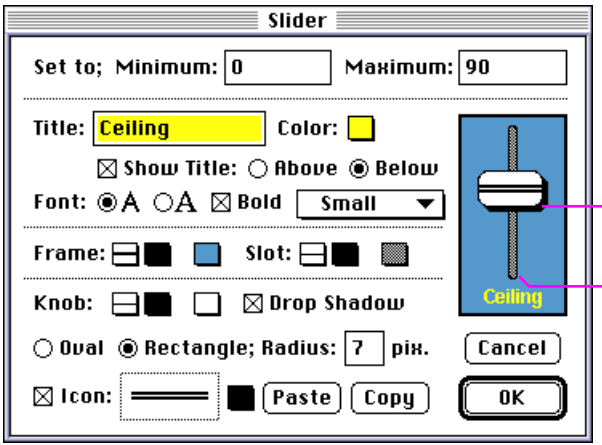
Title

Although the title text can be displayed in the indicator, you may prefer to put a text label next to it. This can be done using a Static Text item (see page 174).

Slider

A slider is used to control a level or other numeric value. It can also be used to control the time position of devices that can locate arbitrary time or frame number positions, such as a video disc player.

A slider can be oriented vertically or horizontally on the panel, but the sample in the dialog box will always be shown vertically. You can move the dialog box to the side to see what the real slider looks like without closing the dialog box.

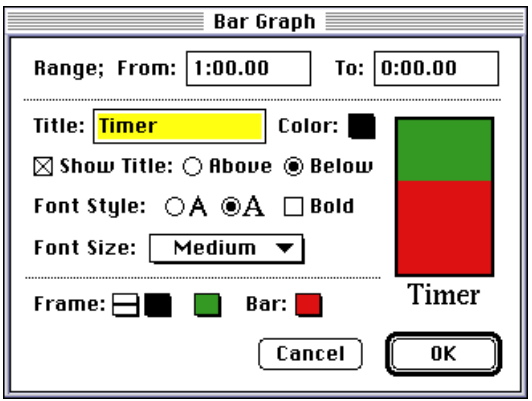


The Minimum and Maximum fields at the top of the dialog box can be used to limit the range, so that the user can't turn the controlled status property fully on or fully off. The size of the knob and slot can be changed by dragging their corners. You can also choose whether the title caption should be displayed above or below the slider. Most other fields are similar to those in the dialog box for the Button item (see page 163).

Bar Graph

The Bar Graph item is very similar to a Slider item, as described on the previous page. However, it can only indicate a value – not change it. You can link it to any numeric or time value.

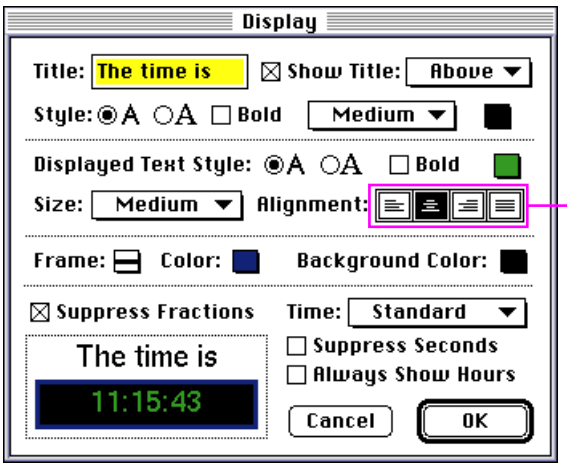
- **IMPORTANT:** You must link the bar graph to a device status property before you can set the Range fields (see "Linking Panel Items to Device Status Properties" on page 160).



- **HINT:** By setting the From value higher than the To value in the fialog box, you can make the indicator go backwards. The same applies to the Minimum and Maximum fields in the Slider's dialog box.

Display

The Display item allows any text or numeric value to be displayed. Arbitrary text strings can be displayed by linking the display to a Text device and assigning a Note cue to that device. Other values, such as numbers and time positions, can be displayed by linking the Display item to the desired status properties.



Left, centered, right or fully justified alignment.

Title

You can choose to display the title of the display item above, below or next to the display field. You can set the color and text style of the title separately from the display content. The alignment of the title, however, is always the same as that of the display content.

If desired, you can turn the title off by unchecking the "Show Title" checkbox and supplying a title separately using a Static text item (see "Static Text" on page 174).

Displayed Text Style

Determines the font style, size, color and alignment of the contents of the display. Note that the alignment setting also applies to the title of the display (se under "Title" on the previous page for more details).

Frame

Determines the width and color of the frame as well as the background color of the display.

Suppress Fractions

This checkbox is available when the display is attached to a device status property that has a fractional part, such as a time or the level of a Level device supporting fractional percentage values.

When selected, the fractional part of the value will not be shown in the display.

Time

The "Time", "Suppress Seconds" and "Always Show Hours" options are only available when linked to a time value. The "Time" pop-up menu determines the displayed time format, allowing you to, for example, display the current frame number from a Video Disc device as a frame number instead of as a time.

The "Always Show Hours" option forces a leading "0:" to be displayed even if the hour is less than 1, which is typically what you want for a time-of-day display.

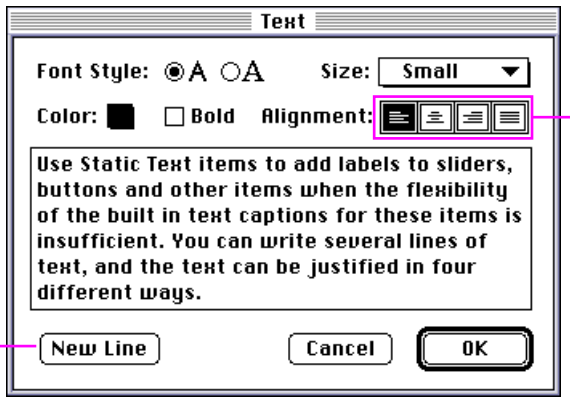
You can use the "Suppress Fractions" checkbox to suppress the display of hundredths of seconds. This option is also implied by selecting "Suppress Seconds".

Line, Frame and Oval

The Line, Frame and Oval tools are used to draw graphics to improve the layout of a page. You can use frames to group related buttons together, or use lines as dividers between groups of items. You can change the look of these items by double-clicking them, just like any other panel item.

Static Text

Use Static Text items to add labels to sliders, buttons and other items when the flexibility of the built-in text captions is insufficient. You can write several lines of text, and the text can be justified in four different ways.


Text
Font Style:
Size:
Small
Color:
Bold
Alignment:
Use Static Text items to add labels to sliders, buttons and other items when the flexibility of the built in text captions for these items is insufficient. You can write several lines of text, and the text can be justified in four different ways.
New Line
Cancel
OK

Left, centered, right or fully justified alignment.

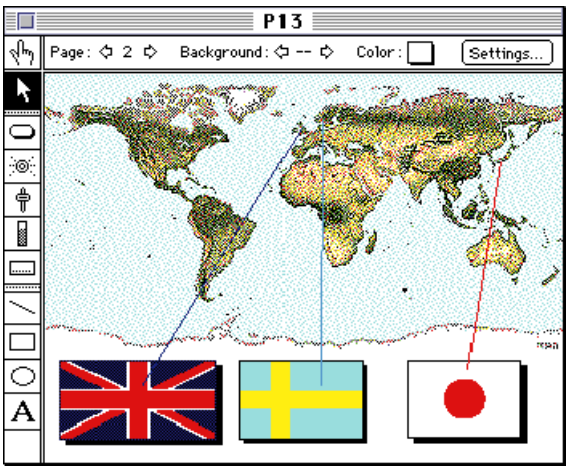
Click here to force a new line at the insertion point.

- **NOTE:** The alignment, color, and other settings are not reflected by the text in the dialog box. Move the dialog box to the side to see the actual text item in the panel's status window.

Pictures

In addition to the basic drawing shapes, you can also import pictures from most drawing and painting programs. Simply copy the picture from the other program and paste it into the panel's status window. This allows you to use a larger variety of fonts, as well as flags, maps and other symbols.

The example below shows four pictures (the map and the three flags). The drop-shadows of the flags are drawn using the Frame tool and filled with black. The three lines connecting the flags with the map are drawn using the Line tool, and then colored as appropriate.



Color Fidelity of Pictures

Owing to the limited number of colors available on the TOUCHLINK panel, you may run into problems with some kinds of pictures. Sometimes, mixing color pixels with alternating colors (often referred to as "dithering"), can improve the colors. Check the documentation for your drawing program for details.

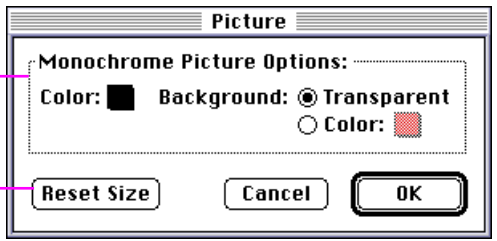
Picture Options

Although most aspects of pictures can't be changed in TRAX, there are some details you can influence. You can, for example, re-size the picture by dragging any of its four corners. Sometimes, this may result in a jagged picture, depending on the origin of the picture. Pictures from "Draw" programs usually look better when re-sized than pictures from "Paint" programs.

You can use the "Reset Size" button in the picture's dialog box to restore the original size of a picture.

These options apply only to monochrome pictures.

Click this button to restore the picture to its original size.



Color. Allows you to colorize the pixels of a monochrome picture.

Background. Colorizes the background of monochrome pictures. By default, the background of monochrome pictures appears transparent.

- **NOTE:** The settings inside the "Monochrome Pictures Options" box apply only to originally black and white pictures.

Testing a Panel

There are two ways you can test your panel within TRAX, without actually using a real, physical panel device:

- By running the panel on its own, controlling only the devices directly linked to its items.
- By running the full system, possibly starting timelines and other tasks.

The first method is useful if you just want to see what it looks like when the panel is operated. Select the hand tool then click the buttons and drag the sliders. Pressing the space bar toggles between the hand and arrow tools. Linked devices will be controlled by the items (unless they're owned by tasks, in which case they can't be controlled by panel items, as described under "Priority of Panel Items vs. Tasks" on page 162).

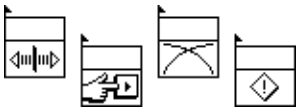
The second method allows you to run the entire system, including all currently open panel windows. Click the Play button in the Task window (or press Command-space) to activate the system run mode. You can then operate panel buttons and observe the system's response to your actions. See "Running the Tasks" on page 60 for more details.

Downloading Your Panel Design to TOUCHLINK

The panel design is downloaded, possibly together with the SMARTPAX device drivers, using the Download button in the Device Support window. You can choose to download just the panel design using the "Panels Only" choice on the pop-up menu in the Device Support window. See "Downloading Panel Designs" on page 70 for more details.

After downloading to the panel, you can test your design using the real, physical panel device. In order to run the full system, first click the Play button in the Task window (or press Command-space).

7 CUES



Cues are the active elements of TRAX – they tell the devices what to do and when to do it. The *what* part is determined by the kind of cue chosen as well as its internal specifications. The *when* part is determined by the cue's position along a timeline or in the Task window. Cues are assigned to the devices to be controlled using the mouse.

Cues are entered into a timeline or the Task window by selecting them from the Cue menu, or by entering the name of a customized cue using the keyboard (timelines only). See "Timeline Window" on page 29 for details on how to select cues, use tracks, etc. See "Adding a Task" on page 51 for details on using cues as task actions.

The Cue menu shows the basic cue types. Customized cues appear as secondary pop-out menus next to each basic type on the Cue menu. See "Customized Cues" on page 95 for more details.

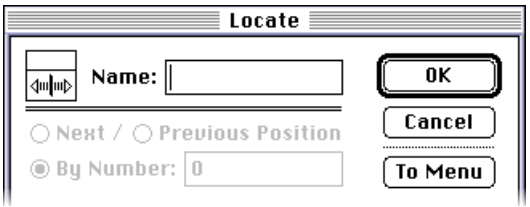
Editing a Cue's Specifications

Once a cue has been entered into a timeline or the Task window, you can change its specifications using its dialog box. The remainder of this chapter discusses the contents of each cue's dialog box in detail. To open the dialog box, first select the cue then choose Specifications on the Edit menu, or simply double-click the cue.

- **HINT:** You can only open the dialog box of a single cue at a time. You can, however, change various specifications of multiple cues in one operation using the Expand/Compress and Find/Replace commands (see page 90 and page 85 respectively).

General Cue Characteristics

All cues have a common set of characteristics: a name, a time position and a track. In order for a cue to have any effect, it must be assigned to the device to be affected (the only exception being the Control cue, which doesn't control devices directly).

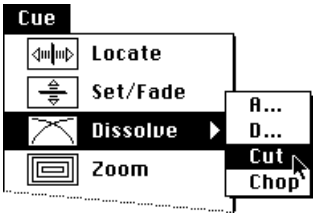


Name

The name of the cue is specified in the name field of the cue's dialog box. This name is displayed as part of the cue's icon in a timeline window, or to the right of the icon in the Task window. It is also used to refer to the cue when it's installed as a customized cue on the Cue menu (see "To Menu" on page 180).

For many cue types, you can specify a partial name consisting of some characters followed by an ellipsis (…). See "Cue Name and … Value Substitution" on page 181 for more details..

To Menu



Customized Dissolve cues installed on the Cue menu.

This button installs the cue – including all its specifications – on the Cue menu. This saves you from re-entering the same, or similar, specifications repeatedly. Simply enter it once and put the cue on the menu. Then choose the cue from the menu or type its name on the keyboard to use it again.

To create a customized cue, start by selecting a basic cue type from the menu, or an existing cue in a timeline window. Open the cue's dialog box. Enter a suitable name, configure the cue's specifications as desired, and click the To Menu button. The Cue menu flashes briefly to indicate that a cue has been added. Click OK to close the dialog box. Pull down the Cue menu to see your new cue next to its basic type (see "Customized Cues" on page 95).

You can now use your customized cue either by selecting it from the menu or by typing its name on the keyboard.

- **HINT:** Customized cues can retain their device assignment. To use a customized cue's original device assignment, ensure that no devices are selected when choosing the customized cue. If any devices are selected when the cue is chosen, they will take precedence over the original device assignment.

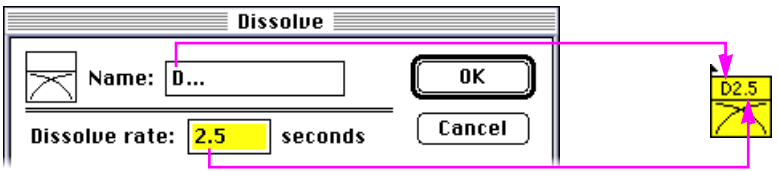
The "To Menu" function is particularly useful in conjunction with the value substitution feature described on page 181. It allows you to create generic cue types where the actual value is specified when the cue is entered into a timeline window, rather than when it's put on the menu.

The name of a customized cue can't be blank or contain any blanks. Nor can it contain any of these characters:

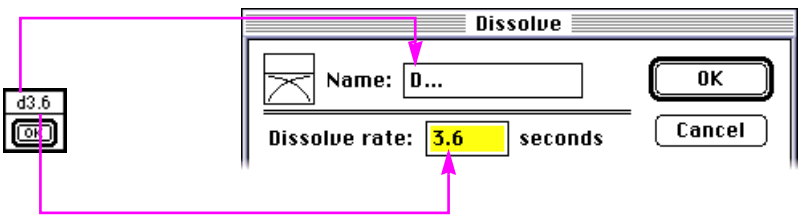
; ^ ! < / (

Cue Name and ... Value Substitution

It may be useful to have the name of the cue, as shown in its icon, reflect its primary value. For example, a Dissolve cue named D3 indicates that it is a 3 second dissolve, or L341 is a Locate to position 341. Rather than creating each individual cue with its value appended to the name field, you can simply type an ellipsis at the end of the cue's name. When displayed as part of the cue's icon, the ellipsis will be replaced with the cue's *primary value*. The primary value is typically the first field in the tab order following the name field.



This feature is particularly useful in conjunction with customized cues (see "To Menu" on page 180). When choosing a customized cue using the keyboard, you can simply enter the value directly in place of the ellipsis, rather than going through the dialog box.



When selecting a cue ending in … from the menu, the dialog box will open automatically with the primary value selected

Time Position

The time position of a cue is displayed in the upper left corner of the timeline window when the cue is selected. You can see the time positions of multiple cues by switching to list view (see "List View" on page 46).

To change the time position of cues, simply drag them along their track. It is not possible to change the time position numerically in list view.

- **SHORTCUTS:** Pressing Command-right-arrow or Command-left-arrow moves selected cues forward or backward in 0.01 second increments. When combined with the Shift key, the cues are moved in 0.1 second increments. You can also move the cues by the current Tab time by pressing Command-Tab or Command-Shift-Tab (see "Tab Key Time" on page 104). These shortcuts can be used in list view as well.

The time position of multiple cues can also be changed using the Distribute Cues and Expand/Compress commands (see page 89 and page 90).

Track Assignment

Each cue in a timeline window is associated with one of 16 on-screen tracks. The track assignment is for your convenience only, and has no effect on the cue's behavior or device assignment. Nor has the track assignment any relation to the tracks on a multi-track recorder if you choose to record a cue track. If the show is recorded on tape, all cues will be recorded onto a single tape track.

To change the track assignment of a cue, simply drag it to another track in icon view. Press the Shift key as you drag to avoid moving the cue in time.

- **SHORTCUT:** Pressing Command-down-arrow or Command-up-arrow moves selected cues down or up one track. These shortcuts can be used in list view as well.

Device Assignment

Most cues must be assigned to one or many devices in order to have any effect. The exception is the Control cue, which acts on TRAX itself rather than a device.

Device assignment pointer: ⌖

A cue is assigned to devices by first selecting the cue, then selecting the desired devices in the Device window using the device assignment pointer. The device assignment pointer is only shown when a timeline or the Task window is active and the pointer is within the Device window.

▼ **IMPORTANT:** Be careful how you use the device assignment pointer, as it changes the device assignment of any selected cue. If you want to work with the devices only, first select the Device window by clicking its title bar.

You can use all the standard selection techniques to assign devices to a cue (page 24). When assigning devices to an existing cue, make sure that the cue is selected before you start clicking devices. When creating new cues, you can select the desired devices before creating the cue, however.

◆ **HINT:** You can change the device assignment of multiple cues using the Find/Replace command (page 85). First select the cues you want to change then use the Find/Replace command by selecting the All at Once, Device Assignment and Selection options. Type the name of the old device into the Find field and the new device into the Replace With field.

Importing Customized Cues

As a complement to creating customized cues one by one, you can also import entire sets of customized cues from other shows using the Import Menu Cues command on the File menu. See “Import Menu Cues” on page 76 for more details.

Saving Cues in the Scrapbook

Sometimes you may have a set of cues – rather than an individual cue – which together perform a desired effect. These cues can be stored in the Scrapbook for later use.

- Select the cues.
- Choose Copy on the Edit menu.
- Open the Scrapbook under the Apple menu.
- Choose the Paste command on the Edit menu.

For sets of cues, begin the set with a Note cue that says what the set does. You will then be able to see this note in the Scrapbook.

Grouping and Locking Cues

When a set of cues perform a specific function, it is useful to group them together. Grouped cues will always stay together, maintaining their internal time relationship. To group a set of cues, first select them, then choose Group on the Object menu. Once grouped, all members will be selected when you select one of them. See "Group, Ungroup" on page 91 for more details.

Once you're finished tweaking the cues on one part of the timeline, you may want to lock the cues to avoid changing them by mistake. If you try to change a locked cue in any way, TRAX will display an alert box to warn you. To lock a set of cues, first select them, then choose Lock on the Object menu. See "Lock, Unlock" on page 92 for more details.

Printing Cues

Although TRAX doesn't have any built-in Print functions, you can still print the cues of a timeline using virtually any word processing program. The printout has the same format as the list view of the cues. To print the cues, select the cues to be printed and choose Copy on the Edit menu, then paste them into your favorite word processor. See "Printing Cues" on page 50 for more details.

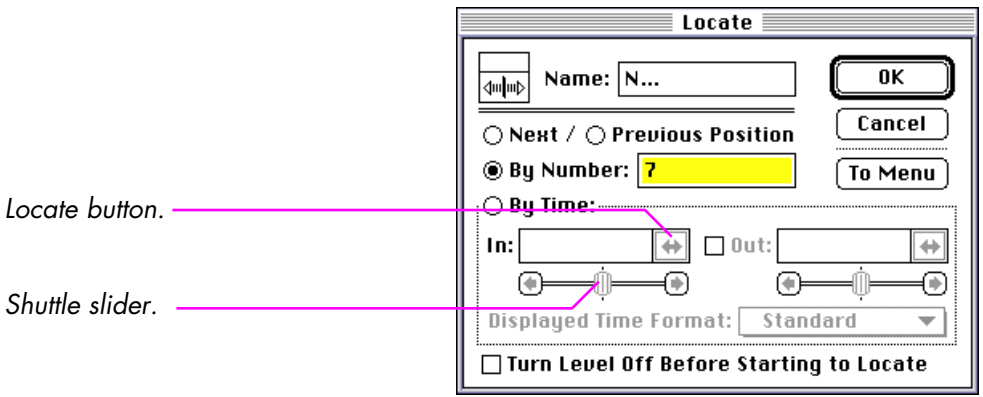
To print the cue icons as a picture, choose Icon View, then zoom the timeline window to full-screen size by clicking the zoom box in the upper right corner of the window. Press Command-Shift-3 to take a snapshot of the screen. The snapshot ends up as a picture file on your hard disk, which can then be opened and printed from your word processor, paint program, etc.

- **HINT:** Double-clicking the resulting picture file will automatically open it using Simple Text, ready to be printed.

Locate

Use the Locate cue to locate specific positions on a device's medium. This can be used with most devices that have a position, such as a slide number in a slide projector, a picture in a computer graphics program, a frame number on a video disc, a time position on a video tape, or a song number or specific time position on an audio disc.

These devices can be grouped into two categories: discrete position devices and time-continuous devices. Slide projectors and computer graphics programs fall into the former category while many "players" fall into the latter.



Next/Previous Position

Use these selections with discrete position devices to locate the next or previous position, for example, to step one slide forward or reverse on a slide projector.

On video devices capable of reproducing still images – such as most video disc players – the Next/Previous selections can also be used to advance a single frame.

▼ **IMPORTANT:** In this case you must make sure that the time format pop-up in the video disc device's status window is set to match the frame rate of the video standard being used. This is important as this setting is then used to calculate the time position of the device. The Normal setting assumes the 25 fps PAL frame-rate.

By Number

Use "By Number" with discrete position devices to locate a particular image, song, chapter or other numeric position.

Some time-continuous devices are not capable of locating time positions, but may be able to locate discrete, numeric positions. This includes most audio disc players – which often allow you to select a song number – as well as some video disc players using chapter numbers.

◆ **NOTE:** Do not use "By Number" to locate frame numbers on video. Instead, use "By Time" and set the Displayed Time Format to one of the "Frames" settings.

By Time

Use "By Time" with devices capable of locating arbitrary time or frame positions, such as many professional tape and disc players. Make sure that the "Position by: Time or Frame Number" is selected in the device's configuration dialog box (see "Position By" on page 134).

The double-arrow Locate button to the right of the In field allows you to immediately go to the specified position, for example to adjust the position using the shuttle slider. As soon as you dismiss the dialog box, the device will return to the position it had before the dialog box was opened.

The shuttle slider below the In time field is used to wind the device's medium in the direction you drag the slider. The speed at which the device will wind depends on how far you drag the slider (assuming that the device supports variable speed winding). The arrow buttons at each end of the slider single-step the device one frame at a time.

In order to use the shuttle slider and frame step buttons, the device must be connected to a properly configured SMARTPAX. The time position displayed in the time field while using these controls is retrieved from the device being controlled.

- **NOTE:** If multiple devices are assigned to the Locate cue, only the first device will be operated interactively from the dialog box. When running the cue, however, all assigned devices will locate the specified position.

In order to adjust an existing time position using the shuttle slider, first click the double-arrow Locate button next to the In time field, then wait for the device to locate before you start using the shuttle slider. If you click the shuttle slider before you click the Locate button, the field will be set to the current position of the device. This can be used to pick up the current position in order to use it as an in-point for a contiguous play-to-frame command (see next section).

Out Time

Selecting the Out option allows you to specify an out-time for the segment about to be played. The Out time field is used like the In field, but specifies the end point for the next Trigger Play cue. This lets you to take advantage of the

play-to-frame feature built into most video disc players, as well as some tape players.

If you select this option, the device will automatically stop in still mode at the specified position. The advantage of this method over simply putting a Trigger Pause cue at the end of the segment is that it guarantees that the end position will be exactly the right frame, while using a Trigger cue to stop it may be off by a few frames due to timing differences between the computer and the player.

- **NOTE:** You must use a separate Trigger Play cue to actually start playing the tape or disc. Some players impose restrictions on available playback speeds when using the play-to-frame feature.

Displayed Time Format

The time fields in this dialog box can use a variety of standard formats. See "Time Formats" on page 137 for a detailed description of the time formats.

- **NOTE:** The time format chosen in the Locate cue only affects how the values are displayed. Thus, it is not necessary to use the same time format in the Locate cue as in the device being controlled. You may, for example, freely switch between Frame formats and the Normal format in order to calculate the real-time duration or starting time of a segment.

Turn Level Off

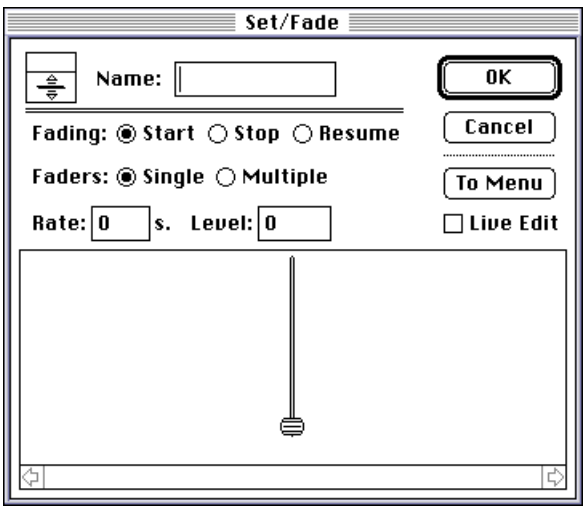
When checked, the device will turn its output level off before locating the specified position. In the case of a slide projector, this means turning the lamp off. When applied to a video player, it means turning the video output off (if possible).

Set/Fade

Use this cue to set or fade the output level of a device to a specified level. When used with a slide projectors or lamps, this means fading the lamp level. When used with an audio device, the volume is controlled (if possible).

When applied to a video player, the video output level is controlled, if possible. Use 0% and 100% only for video devices, and set the Rate field to 0.

When used with slide projectors, the Fade cue uses a linear lamp curve while the Dissolve, Wipe and Zoom cues use a nonlinear curve. The linear ramp of the fade cue makes it suitable for fading to or from black, while the nonlinear curve of those other cues is tailored to make smooth transitions between images.



Fading Start

Select this option to start a new fading, then enter the rate and target value of the fading in the corresponding fields. You can also choose whether to fade all assigned devices to the same level or to independent levels using the Single/ Multiple controls.

Fading Stop/Resume

Allows you to stop and resume a fading already in progress – an effect also known as a Freeze. This can be used as a way to fade to an intermediate level by timing the relation between the cue that starts the fading and the Fading Stop cue. This allows you to hold the brightness of a Dissolve, Wipe or Zoom cue at an intermediate value.

Alternatively, you can use a Fade cue with the desired target value.

Rate

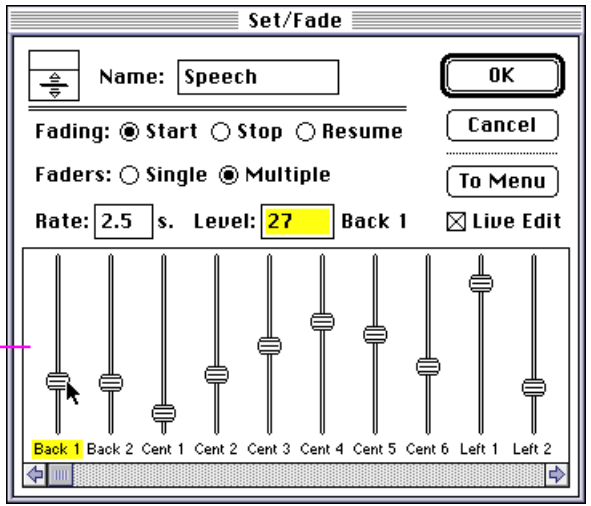
Determines the rate of the fading, in seconds. The value can be specified with an accuracy of 0.1 second. Not all devices are capable of fading the level, in which case the Rate value will be ignored.

For devices controlled through SMARTPAX (except slide projectors), the rate value determines the time taken to reach the new target level from the current level. Thus, a three second fading will always take three seconds, regardless of the starting and ending levels.

For slide projectors and devices controlled through other control units, the rate value determines the slope angle of the fading, assuming a fading from 0 to 100 percent. Thus, performing a fading from 0 to 50% takes half the specified time with these devices.

Faders Single/Multiple

The Single fader selection will make all assigned devices fade to the same target level. Selecting Multiple Faders, however, enables you to enter an individual value for each assigned device. This selection provides separate level sliders for each device, making it suitable for lighting and sound control applications. Combine the Multiple Faders mode with the Live Edit check box for fully interactive editing of lighting, sound, motor positions, etc.


Set/Fade
Name: Speech
OK
Cancel
To Menu
Fading: Start Stop Resume
Faders: Single Multiple
Rate: 2.5 s. Level: 27 Back 1
Live Edit
Back 1 Back 2 Cent 1 Cent 2 Cent 3 Cent 4 Cent 5 Cent 6 Left 1 Left 2

Multiple Faders selected.

Level

This value determines the new level for the device at the end of the fading. If the rate field is set to 0, the level will immediately be set to the Level value. For increased precision, the level value can be specified with an accuracy of 0.01 percent (this is not supported by all devices).

As an alternative to entering a numeric value in this field, you can also use the level slider located below the Level value field. When the "Multiple Faders" option is selected, the Level field shows the value of the currently selected fader. The name of the currently selected fader corresponds to the name of its assigned device, and is also displayed next to the Level value field.

Some devices (e.g., video devices) can't handle intermediate values, in which case any level except 0 will be considered as "on".

Live Edit

When selected, the assigned device(s) will immediately take on the specified level value(s). This allows you to set, for example, light levels, pan and tilt positions, volume levels, etc. Used together with the Multiple Faders option, this provides a virtual lighting or mixing console.

- **NOTE:** As soon as you close the dialog box, the levels will revert to their correct values at this point on the timeline. Play the timeline to see the new values take effect in conjunction with other cues.

Dissolve

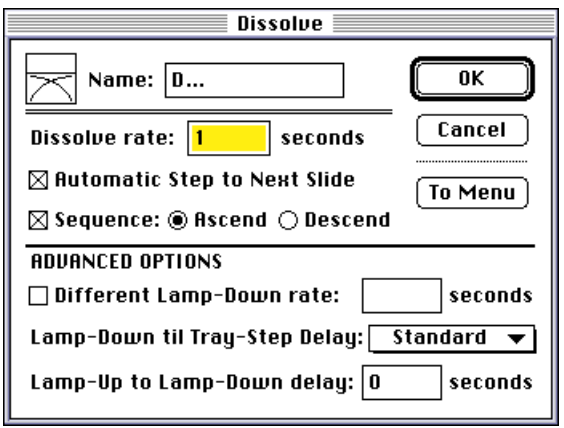
The Dissolve cue applies only to slide projector devices. It is used to create cross-fades between projected images. It provides detailed control over the dissolve characteristics as well as the sequencing of projectors.

Dissolve Rate

Determines the time it will take to dissolve from one image to the next, in 0.1 second steps. For very fast dissolves, in the range 0.1 to 0.5, it is often a good idea to specify a slightly slower Lamp-Down rate, or a small delay between the Lamp-Up and Lamp-Down parts of a crossfade (see “Advanced Options” on page 196).

Automatic Step to Next Slide

Select this option to make any projectors that are fading down automatically advance to the next slide position. The delay between when the lamp current is turned off and the tray is actually advanced is entered in the Preferences dialog box (page 110), but may be overridden, should the need arise, as described



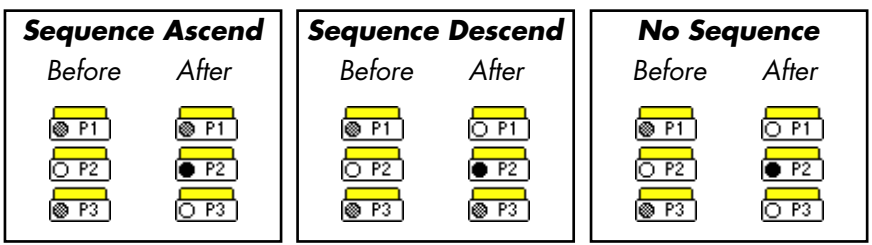
under "Advanced Options" on page 196. This extra delay is required to account for the thermal lag of the lamp, in order to avoid chopping off the light at the end of the dissolve.

- **NOTE:** When making multiple dissolve, wipe or zoom effects in rapid succession, allow enough time for the projectors to advance to the next slide. The projectors' "ready" status is indicated by their icons in the Device window. See "Slide Projector" on page 123 for more details.

Sequence Ascend/Descend

When enabled, selected projectors within the same screen area will sequence automatically using their designated sequence orders. This means you don't have to explicitly specify which projectors to turn on and off for each single dissolve. You simply select all the relevant projectors, and let the Dissolve cue figure out the rest.

Use Sequence Descend if you want the sequence order reversed. This can be used, for example, to dissolve forward through a set of slides (without advancing the trays), and then reverse the sequence, dissolving back to the original slide again.



Advanced Options

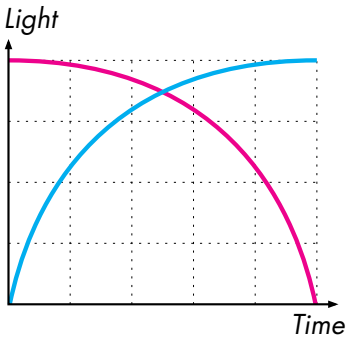
Fast dissolves or sequences of dissolves may need some tweaking before they perform the way you want. The Advanced Options gives you this capability without the need to resort to separate cues for projectors to fade on and off. For example, a fast dissolve, with a total time of 0.2 seconds, may look better if the projector that comes on does so slightly faster than the one that goes off. This compensates for the thermal lag of the lamp, and may differ according to the model of projector used.

Another way to put some punch into a dissolve is to introduce a small delay (a few hundredths of a second might be enough) between the lamp that turns on and the one that turns off.

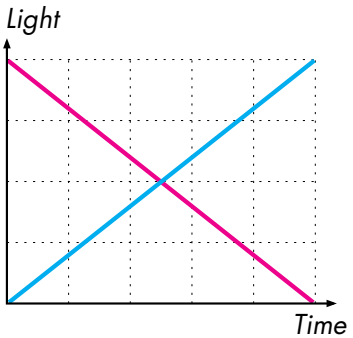
For fast sequences of slides, or when slides are uneven in brightness, you may need to override the tray advance delay, choosing a shorter or longer delay time. This only applies to the particular cue, and doesn't affect other cues or the standard tray step delay set in the Preferences dialog box.

Fade and Dissolve Curve Shapes

The Dissolve cue results in a non linear lamp curve, suitable for cross-fades between projectors. You can also fade a projector lamp using a Fade cue. This results in a linear ramp, appropriate for fading to or from black.

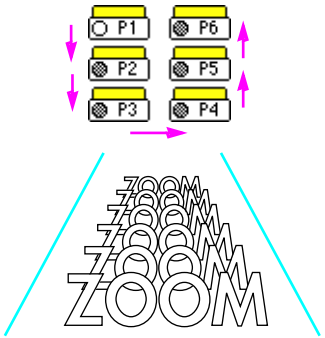


Nonlinear crossfade using a Dissolve cue.



Linear fading using a Set/Fade cue.

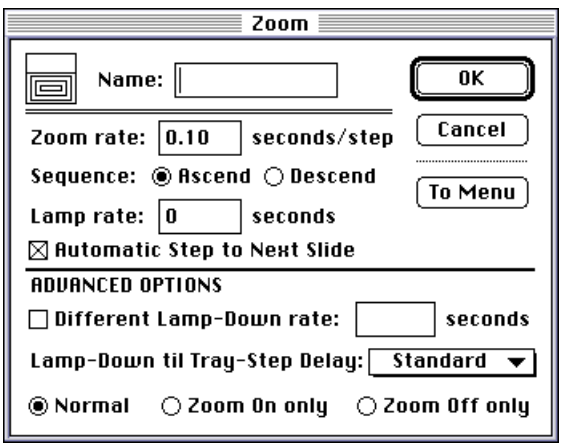
Zoom



The Zoom cue acts as a kind of compound dissolve, applying a number of successive dissolves to the selected slide projectors. It is useful when you have more than two projectors on the same screen area (see "Hint" on the next page for another possible use).

Used with a suitable slide sequence, the Zoom cue can create a sense of motion, or a change in perspective. It can start from a lit projector or with all projectors off. You should be familiar with the Dissolve cue before using Zoom as many settings are similar.

In general, the more projectors you have on a screen area, the fancier zooms you can make. As the projectors can't bring up new slides fast enough, it is usually not practical to make a zoom that uses the same projector more than once through the effect.



- **HINT:** Applying a Zoom cue to a single projector makes a momentary flash effect, with the capability of specifying a different lamp on and lamp off rate as well as the flash time. Such brief flash effects are often used to highlight items in other images, or for glow effects.

Zoom and Lamp Rates

The time between each step in the zoom effect is called the Zoom rate, and can be specified in increments of 0.01 seconds. It is usually a small value, around 0.1 second.

Sequence

Normally you would have the zoom sequence in ascending order, but going backwards (descending order) can be useful if you want to reverse a zoom effect using the same slides.

Lamp Rate

The Lamp rate of a zoom is usually set to a small value, equal to, or smaller than, the Zoom rate. You can use a zero-second Lamp rate and a Lamp-Down rate of a few tenths of a second to make a tail-effect on the zoom.

The Automatic Step to Next Slide and Delay parameters are the same as for the Dissolve cue (page 194).

Normal / Zoom On / Zoom Off

Use Zoom On to leave all projectors involved in the zoom effect with their lamps on. This can be useful if you want a very long tail-effect on the zoom. You can then use a second Zoom Off cue to take out the desired projectors.

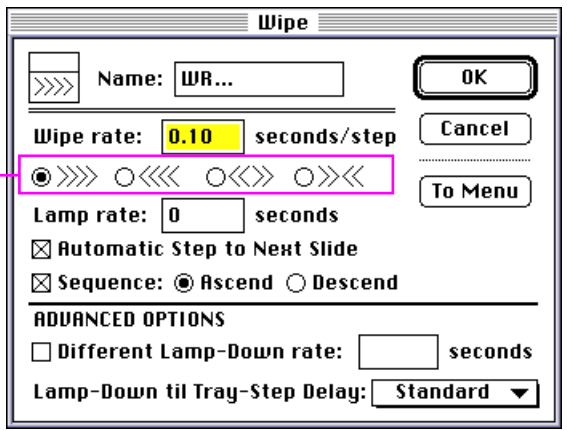
Zoom On and Zoom Off can also be used to create rapid "builds", more akin to a wipe on a single screen area than a zoom. This could, for example, be an image broken up into horizontal stripes, each projected by one projector.

Wipe

This is also a kind of compound dissolve, just like the Zoom cue. It applies a number of successive dissolves to slide projectors on selected screen areas. It can only be used when you have multiple slide projector screen areas.

A Wipe is a good alternative to a straightforward panorama dissolve, as it introduces a sense of motion or creates a reveal effect. You should be familiar with the Dissolve before using the Wipe as many settings are similar.

Just as a Zoom is more effective with more projectors per screen area, a Wipe gets more impressive the more screen areas you have. There is no point in making a wipe on a single screen, although you may use a Zoom to create a wipe-like effect on a single screen with multiple projectors (see the hint on page 199).



Wipe direction.

Wipe Direction

Wipes can be done from left to right, right to left, center out, or from the sides towards the center (the last one being the least common). Which one to choose depends on the image or images, and what kind of motion they convey. For example, a panorama over a race track with the cars going from right to left should probably be wiped in from left to right, as the leading car is on the left side. A front view of people running towards the viewer should be wiped in from center and out, adding a sense of depth to the transition.

The wipe's direction depends on the Screen Area numbers set for each projector involved, not its physical position in the Device window. Indeed, these may be opposites if you're preparing a rear-screen presentation, viewing it from the projector side during production.

Wipe and Lamp Rates

The Wipe rate is the time between each step of the wipe effect, and is usually in the range of tenths of a second. A higher number results in a slower wipe. The Lamp rate is the dissolve rate used for each screen, and may be greater than the Wipe rate. You can specify a Different Lamp-Down rate, resulting in a tail effect. However, too much of a difference may make the transition look clumsy. You may also use a smaller value here to remove the old image first before the new one comes up, for example a zero second Lamp-Down rate on a one second Lamp (up) rate.

See the Dissolve cue on page 194 for the remaining settings.

Flash

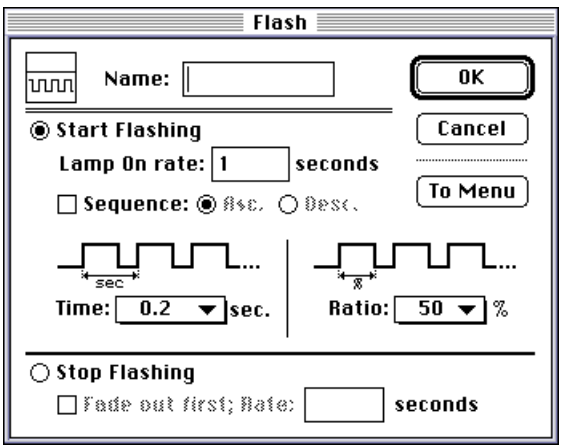
The Flash cue applies to slide projectors only. It initiates a flash effect that can be used either for a single projector flash (i.e., to highlight a city on a map), or a sequential flash effect used in multi-projector animations.

Simple Flash Effects

To make a simple flash effect, select the projector or projectors to flash, and make sure that the Sequence option in the Flash dialog box is unchecked. Specify the Lamp On rate for projectors that are to be turned on (this parameter has no effect if they're already on). Use the Time and Ratio pop-up menus to fine-tune the flash effect. The Ratio parameter determines the duty cycle of the projector lamp. For fast flash effects this primarily affects the brightness, but for moderate and slow flashes the duty cycle is readily apparent. It is normally set to 50% (on half the time and off half the time).

Stopping a Flash

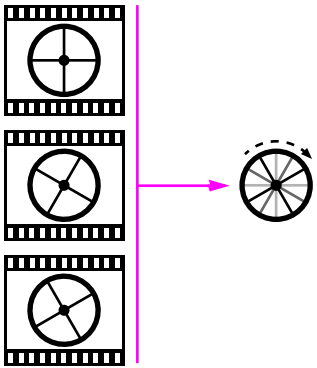
Once started, the flash effect will continue regardless of other fading and



dissolve cues, until explicitly told to stop. Thus you can fade the lamp up and down while still flashing.

Use a new Flash cue to stop the flash effect, but now select the Stop Flashing part. Decide if the flash should simply stop (possibly with the lamp still on), or if the light should be faded out before the flash effect is stopped.

Sequential Flash Effects



If you select the Sequence option for Start Flashing, TRAX will attempt to stagger the flash effects of the selected projectors so that the lamps will be flashed in order. This can be used to create a simple alternating flash between two projectors on the same screen area, or a sequential animation using three or more projectors. Such an animation, combined with the right images, will introduce a sense of motion. This can, for example, be three pictures of a wheel, taken from the same spot but with the wheel rotated to three successive angles.

For such animations, you would normally use a rather slow flash rate (i.e., high Time setting) at a 50% or 30% ratio, depending on the number of projectors involved and the degree of overlap you desire. More complex animations involving multiple projectors and different animation rates and/or ratios can be created using the Snap cue as described on the next page.

Using Soft Snap to Start and Stop a Flash Effect

If you want to start an animation from an image already on the screen, you must first prepare the other projectors to be included in the animation by closing their Soft Snaps (using a Snap cue), and turning them on using a Set cue. As the soft snaps are closed, no light will reach the screen until the Flash cue is performed. This trick avoids the additional delay caused by the Flash cue if it has to turn the lamps on before starting to flash them. You can also use Soft Snap to stop a Flash or animation effect, in which case the imaginary light levels will remain on, but the Soft Snaps will be closed.

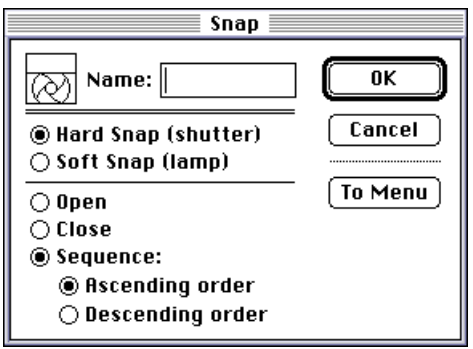
Snap

There are two kinds of Snap cues: the Hard Snap and the Soft Snap. The Hard Snap uses the mechanical shutter built into most professional slide projectors. This gives a very sharp, abrupt effect compared to simply turning off the lamp. Remember that when you turn a projector lamp off, it takes a few moments for the light to die away completely owing to the thermal lag of the lamp.

▼ **CAUTION:** To use the Hard Snap, you must have a slide projector with a controllable shutter. A show that uses Hard Snap cues will not run properly on projectors that don't have this feature!

Soft Snap

A Soft Snap Close cue turns the projector lamp off instantly. The difference between a Soft Snap and a plain Set cue is that the Soft Snap doesn't affect the imaginary lamp intensity. Any fading in progress will continue, and the brightness can be restored using Soft Snap Open. This is similar to a Flash cue, but provides greater control over the sequencing of events.



Open, Close and Sequence

Use Open or Close to specify what the projector should do. Use Sequence when you just want the Hard or Soft snaps to change their states, or to sequence themselves within one or many screen areas (see "Sequence" on page 199).

Using the Sequence mode of a set of successive Soft or Hard Snap cues, you can create a sequential animation with detailed control over the speed and other characteristics. This is done by creating the first Soft Snap cue (using its Sequence mode), assigning it to the projectors to animate, and then duplicating this cue for the desired duration of time (see "Duplicate" on page 81). You can use the Expand/Compress or Distribute Cues commands to alter the duration and speed of such an animation afterwards.

- **HINT:** Whenever you can do an animation effect using a Flash cue, do it. If you want a slower speed than can be achieved by a Flash, or greater control, use a string of Soft Snap cues set to Sequence to create the desired effect.

Using Soft Snap with Flash

Soft Snap can be used after a Flash cue in order to start or stop the flash effect in a specific way. See "Using Soft Snap to Start and Stop a Flash Effect" on page 203 for more details.

Trigger

The Trigger cue is used to perform many functions in a way similar to pressing buttons on the devices being controlled, such as resetting the device, controlling switch closures, tape or disc transport functions, or control of other device-specific modes and functions.

Switch

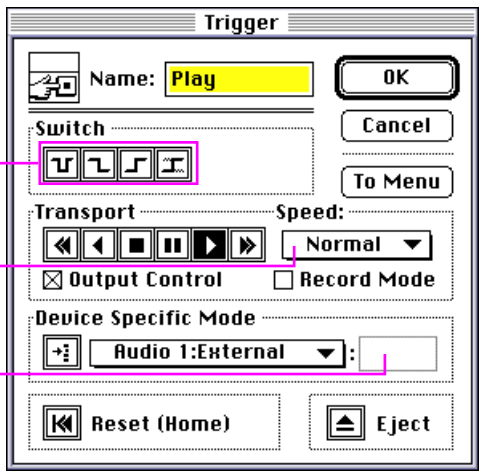
The four buttons in the Switch area allow you to pulse, turn on or off or toggle Switch device outputs. This can be a relay switch or a solid state switch.

The Pulse button causes the output to be momentarily activated for 0.2 seconds. The On and Off buttons causes the output to be turned on or off continuously. The Toggle button will turn on the output if it is currently off and vice versa.

Pulse, On, Off and Toggle functions, used with Switch devices.

Play speed pop-up menu.

Device specific mode value field.



Transport

The six buttons in this area control basic transport functions related to tape, video or audio disc devices. Not all buttons are applicable to all devices – for example, only video disc players are capable of playing backwards.

Rewind

Play reverse

Stop

Pause

Play

Fast Forward

When selecting one of the Play buttons, the Play Speed pop-up menu – located to the right of the six transport buttons – becomes active, allowing you to specify the desired playback speed. This can be used with video disc players that have this capability. Some speeds may not be available on some players – see the corresponding pop-up menu inside each video disc device's dialog box for information on available speeds. Some video disc players impose further restrictions on available playback speeds when playing to a target time using the Out field in the Locate cue. Most video disc players are incapable of playing backwards, or at other than normal speed, when used with CLV discs. See "Video Disc" on page 143 as well as the device information database entry for your device for more details.

The Rewind and Fast Forward buttons are used with simple players, such as most consumer VHS players and audio cassette decks, which can't locate specific positions. Do not use these buttons with devices that can locate time – i.e., which have "Position by: Time or Frame Number" selected in the device's configuration dialog box – use a "Locate By Time" cue instead.

Output Control

When selected, the output level (sound and/or video) will be automatically turned on or off, as appropriate for the selected transport button. Play will turn it on, Stop, Pause, Rewind or Fast Forward will turn it off. Alternatively, you can use a separate Set/Fade cue to control the output level independently of the Trigger cue.

Record Mode

Use this checkbox in conjunction with the Play transport button to start recording.

- **NOTE:** This feature is not supported by all devices or device drivers. Please check the Record button in the device's status window. If it is grayed out, it does not support recording.

Device Specific Mode

Device-specific modes include such features as sound channel selection, audio muting, index display, etc., and can be used with many tape, video and audio disc devices. This option is also used with Serial and IR devices.

This button, and the pop-up menu next to it are only available when the Trigger cue is assigned to a device that has such modes. See "Device Specific Modes" on page 139 for more details.

In order to use this button, the Trigger cue must be assigned to the device *before* opening this dialog box. When assigned to multiple devices, they must all be of the same type.

- **CAUTION:** If you change the device assignment of such a Trigger cue, or if you change the Type specification in the device's configuration dialog box, the Trigger cue may no longer make sense. TRAX tries to match up the mode using its name. If a mode with the specified name can't be found, you will be notified.

The value field next to the pop-up menu becomes active if the selected mode requires a value. This, again, depends on the device to which the cue is assigned.

- **HINT:** It's possible to create your own drivers for devices controllable by serial data, such as RS232, RS422 or MIDI. These devices are then controlled using Trigger cues that refer to the names of the various commands in your driver. Such drivers may also use the numeric value field, if desired. See Chapter 10 for details on creating your own drivers.

Reset (Home)

This option resets all status properties of the assigned devices to their power-up state. This kind of Trigger cue can be used with all kinds of devices. This is particularly useful at the beginning of timelines when you want some or all devices to always start at their home positions.

Eject

This option causes the device to eject its medium. This can be useful in semi-automatic presentations, where an operator is supposed to change media at pre-determined points in the presentation.

- **NOTE:** This feature is not supported by all devices or device drivers. Please check the Eject button in the device's status window. If it is grayed out, it does not support this feature.

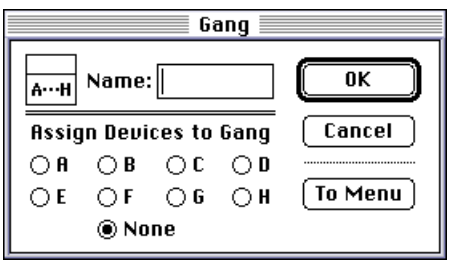
Gang

Gangs are useful in shows that use lots of devices, where you may want to execute a particular cue simultaneously on multiple devices. Normally when executing a cue assigned to multiple devices, TRAX sends a separate instruction through the system data bus to each device. If you send a cue to a large number of devices this may result in a noticeable timing difference between the first and the last device. This can be avoided by first assigning the devices to a gang.

Once a set of devices has been assigned to a gang, any cue sent to all those devices will be sent as a single gang instruction rather than several individual instructions – thereby avoiding any time delay. In effect, the Gang cue assigns an additional address to the specified devices, and then sends the instruction to this common address instead of each device's individual address.

The Gang cue works in conjunction with the "Max Number of Gangs" field in the Preferences dialog box (see page 110). In order to use the Gang cue, you must first set that field to a value greater than zero.

To assign a set of devices to a gang, choose a Gang cue and select one of the settings A through H in the dialog box shown above. Assign the devices to the Gang cue as usual. You can change the gang assignments of the devices using



additional Gang cues, if desired. The None option in the Gang cue removes the gang assignment from the devices assigned to the cue so they no longer belong to any gang.

The gang assignment of a device remains in effect until changed by another Gang cue.

- **NOTE:** The gang assignment is part of the device's status, just like the transport state of a video disc player or the current slide number of a projector. Thus, you must enter a Gang cue on a timeline prior to the point where you wish to use the gang for a particular set of devices

Unlike other status properties, the current gang status is not indicated inside the device's status window. You must click the gang letter at the bottom of the Device window to see which devices are assigned to a particular gang at the current time (see "Device Gangs" on page 28). Be careful, though, so you don't accidentally change the device assignment of any selected cue.

The maximum number of gangs at any one time in the show is eight (A through H). However, as devices can be assigned to gangs dynamically – using additional Gang cues – this is not a serious limitation. A device can only belong to one gang at a time. All devices assigned to a gang must be of the same kind. Furthermore, if used in conjunction with the Device Specific Mode option in the Trigger cue, all gang members must be of the same type.

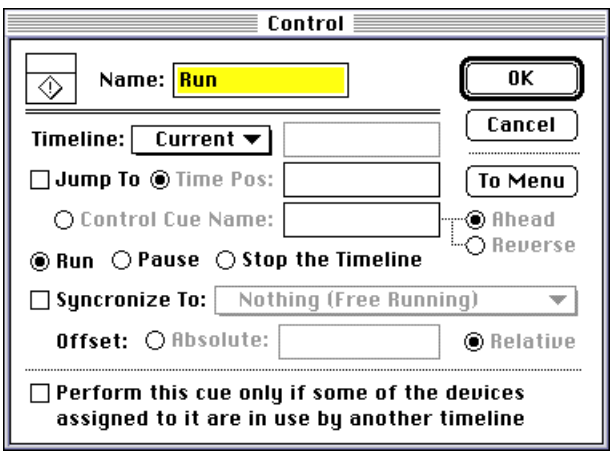
Control

The Control cue is different from other cues in that it doesn't directly control any devices. Instead, it controls the timelines within TRAX itself. This is useful in many cases when the show isn't simply run as a single timeline from start to finish. The show may, for example, be broken up into several parts, of which some are to run automatically – possibly synchronized to a device – and others run manually as speaker support modules, or interactively. See Chapter 8 for some ideas on how to use the Control cue in various kinds of presentations.

Some of the effects of the Control cue are displayed at the bottom of the Timeline Settings dialog box. See "Timeline Settings" on page 103 for more details.

Target Timeline

Use the Timeline pop-up menu to specify the target of the control cue. This can either be the current timeline (i.e., the timeline the control cue sits on), or another timeline. To target another timeline, choose "Named" on the Timeline pop-up menu, and enter the name of the timeline in the field to the right.



Jump To

Select the "Jump To" checkbox to make the target timeline jump to a specific position. If not, it will simply remain at the current position.

After selecting this checkbox, you can specify the destination of the jump either by specifying the exact time position or the name of a Control cue somewhere along the target timeline. If you choose to jump to a Control cue, you can also specify whether to search in the forward or reverse direction relative the current position of the target timeline. This is particularly useful when the target timeline is the current timeline (i.e., the timeline the control cue is on), and you may have several control cues with the same name.

- **NOTE:** When using the "Ahead" option, TRAX will first attempt to search ahead from the current time position of the target timeline. If the named control cue isn't found, it will then also search backwards. So this option will find the named control cue regardless of where it is on the target timeline.

Creating Loops

You can use the Control cue to create loops on a timeline by jumping back to a point earlier on a timeline and repeating a section of cues. To exit the loop, either use the QuickFind feature (see page 88) or a Control cue in the Task window or on another timeline forcing the looping timeline past the "loop back" cue.

See page 229 for an example of how to program a loop.

Run, Pause, Stop

Runs, pauses or stops the target timeline. This is similar to clicking the corresponding buttons in the lower left corner of the timeline window. Stopping the timeline also releases any devices owned by it so they can be used by other tasks.

▼ **CAUTION:** If you pause a timeline and it then remains paused indefinitely, it will retain ownership of all its devices. This can cause problems if other tasks need to access those devices. Thus, when you don't want a timeline to continue to run any longer, you should select Stop rather than Pause. Use Pause only when you intend to re-start the timeline again shortly.

Synchronize To

This pop-up menu allows you to determine the synchronization source for the target timeline. A timeline can be synchronized either to a device or to another timeline. Or it can be "free running", which means that it isn't synchronized to anything at all except the computer's internal clock.

Synchronizing to a device allows you to lock a timeline to the time position of any device that can provide such timing information. This includes most tape and disc players that can locate arbitrary time or frame positions. You must assign the Control cue to the synchronizing device. This device doesn't have to be owned by the timeline to be syncronized.

When using a Control cue on a timeline to start another timeline, you have the option of specifying that the starting timeline is to act as a synchronization source for the started timeline. This keeps the timelines interlocked until one of them is stopped. This allows you to use a timeline as a "macro" from another timeline, e.g. to repeat a sequence of cues by simply triggering the sub-timeline rather than duplicating the cues every time you need them along the master timeline.

The target timeline in this case becomes more like an extension of the starting timeline than an independent timeline on its own. As the starting timeline "owns" the target timeline, it also owns all devices controlled by the target timeline. The starting timeline will continue to own those devices even after the target timeline has stopped. Furthermore, a timeline synchronized to such a "master" timeline can freely use all devices owned by the master timeline.

If you don't want this close relationship between the timelines, simply un-select the "Synchronize To" checkbox so that the target timeline will run on its own, without any special relation to the starting timeline.

Synchronization Offset

When synchronizing to a device, you can specify an offset between the device's time position and the timelines. If you choose "Relative", TRAX will compute an offset that matches the calculated device position and the current position of the target timeline. This is particularly useful if you've just used a Locate and a Play cue to start the device from a specific position.

Alternatively, you may specify the time offset manually for full control. You can specify either a positive or a negative offset. This is useful for example when synchronizing a single timeline to timecode from multiple tape reels, where the timecode on each reel starts at zero. As there can only be one "zero" position along a timeline, you will then have to offset the sync source time for all but the first reel. Alternatively, you may of course use separate timelines corresponding to each of the reels.

The current offset relative the synchronization source for a timeline can be seen at the bottom of the Timeline Settings dialog box for that timeline (see "Current Control Cue Settings" on page 105). This also shows the current synchronization source for a timeline.

Perform Conditionally

Use this checkbox at the bottom of the Control cue's dialog box to ensure that all devices needed to successfully run the timeline are available (i.e., not owned by other tasks with the same or higher priority). If all devices assigned to the control cue *are* available, the control cue will *not* be performed. Conversely, if any of the devices *are not* available, the control cue *will* be performed. This can be used, for example, to conditionally stop the timeline. Or it can start another timeline instead, providing an alternative function if all the required devices can't be accessed (such as displaying a message to the operator/user).

In addition to checking that all required devices are indeed available, the control cue will also claim ownership of all those devices. Thus, after getting past such a control cue successfully, you know that you now own all devices you need, and you can proceed safely.

You may want to use this feature at the beginning of timelines where you know that other timelines may be using the same devices. In this way, you can make the timelines mutually exclusive, based on a set of devices deemed to be critical for each timeline to perform successfully. This set can include all devices to be used by the timeline, or a critical sub-set.

For example, if you have a timeline that runs a slide show as well as controls the houselights, you may want it to run provided that all the slide projectors are available, even if some other task is currently controlling the house lights. To accomplish this, assign the control cue to the slide projectors and select the checkbox at the bottom of the control cue's dialog box to perform it conditionally, in case some slide projectors can't be accessed.

Special Control Cue Names

By giving a control cue a special name, it is possible to instantly jump to this cue by pressing either a function key or a control key combination while the timeline containing it is the current window. This is useful if you don't know in advance in which order the segments along a timeline will run, or if you have a number of different sections that can be chosen depending on the circumstances.

If you, for example, put "F5" in the Name field of a Control cue, you can jump directly to this cue at any time by pressing the F5 function key on the keyboard. If your keyboard doesn't have function keys, or if you need more than 15 direct access points, you can use control key combinations. Pressing A while holding down the Control key will jump to the Control cue named "CA". See "Using QuickFind" on page 88 for more details.

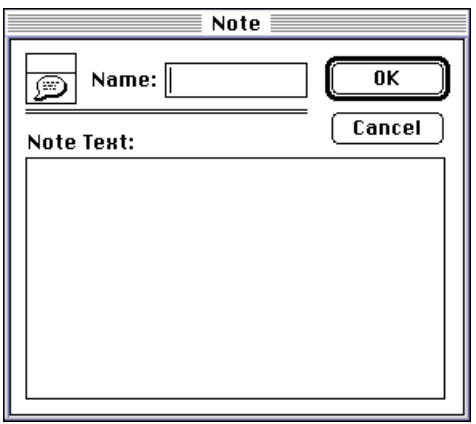
When searching for a Control cue on a timeline, TRAX first scans forward from the current position of the timeline. If not found, it scans backward from the current position. Thus it will always find the closest cue ahead with a given name, in case there are more than one. This allows you to use the same key over and over again along the timeline to exit loops, as described under "Creating Loops" on page 213.

Note

Use the Note cue for your own programming comments or for sending text to Text devices (page 151). By keeping the status window for the Text device open, you can also use it as a speaker prompter, or for manual operator cues (see "Enlarged Font and Black Background" on page 151 for some additional hints).

Furthermore, a Text device can be linked to a Display item on a Panel device, allowing text strings to be displayed on the panel.

- **NOTE:** Pressing the Return key while in the text field of this dialog box forces a new line in the text rather than dismissing the dialog box. Press the Enter key or click OK to dismiss it.



8 PRESENTATIONS

This chapter discusses different kinds of presentations, and shows how you can handle the various aspects of them using TRAX. Examples of presentation methods include:

- Fully automatic, single timeline, "canned" presentations. These run from beginning to end, just as you would normally play a video tape.
- Speaker support presentations. These typically also run from beginning to end along a single timeline, but you can control the pace of the presentation as well as skip ahead or review any section.
- Live presentations, such as theaters, musicals and other events. TRAX can cooperate with your crew, automating many functions and increasing the precision and repeatability of the presentation.
- Interactive presentations, such as in a museum or a visitor center. Here the audience plays a more active role and can choose what should happen, or interact in various ways using touch panels, buttons and other sensors.
- General media integration and control. Whenever you need to provide an easy to use and well integrated "front end" to a heterogeneous set of audio-visual devices, lighting, etc. This could be, for example, in a fixed installation – such as a corporate boardroom – or in a conference rental situation.

While this chapter discusses these kinds of presentations separately, you can of course mix and match these techniques as you see fit in order to create your own unique applications.

Canned Presentations

A canned presentation runs the same way every time, just as a videotape or an audio cassette. Basically, all you can do is start it and stop it. This is the simplest form of presentation you can create using TRAX. Although useful on its own, such a pre-programmed presentation is also commonly used as part of larger, more interactive presentations.

A canned presentation is often programmed using a single timeline, corresponding to the extent of the presentation. You can either run such a presentation from the computer or record it onto a free audio track on an audio or video tape for later playback without the computer.

In its simplest form, all you need to do to make a canned presentation is to put all the cues along a single timeline, and run the timeline. See "Timeline Window" on page 29 for details on how to use timelines. See also "Start Automatically when Opened" on page 108 to learn how to make your show start automatically when the computer is turned on.

Audio Synchronization

A canned, single timeline, presentation is often combined with sound from a tape deck or other device. This can be handled in either of the following ways:

- By controlling the audio device as part of the programming, either free-running or synchronized to the timeline.
- By synchronizing the timeline to the timing information provided by many intelligent professional audio and video players.
- By synchronizing the timeline to timecode recorded on a separate audio track.
- By recording a control signal on a free audio track on the tape, for subsequent playback without using the computer.

Controlling the Device

The most basic way to achieve synchronization between a timeline and an audio or video player is to simply control the player from the timeline. Use a Locate cue to position the device at the desired starting position (see page 186), and then use a Trigger Play cue to start it at the right moment (see page 207).

For devices that can locate accurate time or frame positions, you can choose any location as the starting point. TRAX will then also make sure that the device is positioned appropriately even if you start the timeline from any point after the Play cue, as TRAX can calculate the desired position of the device.

With most professional devices, you can run the device and the timeline "free running" for an extended period of time before any drift becomes noticeable. This is due to the fact that both the timeline in TRAX, as well as the playback rate of the device, are locked to very precise crystal frequencies. This includes all digital audio devices (CD, DAT, etc.), as well as most video devices. Analog audio players are generally not as accurate, however.

For some devices, TRAX may be able to control the speed of the device, and thereby ensure accuracy even over very long time periods. This applies to some audio devices as well as high-end videotape devices normally used for editing. Please check the device information database for details on your device (see "Getting Information on Devices" on page 65).

Synchronizing to an Intelligent Device

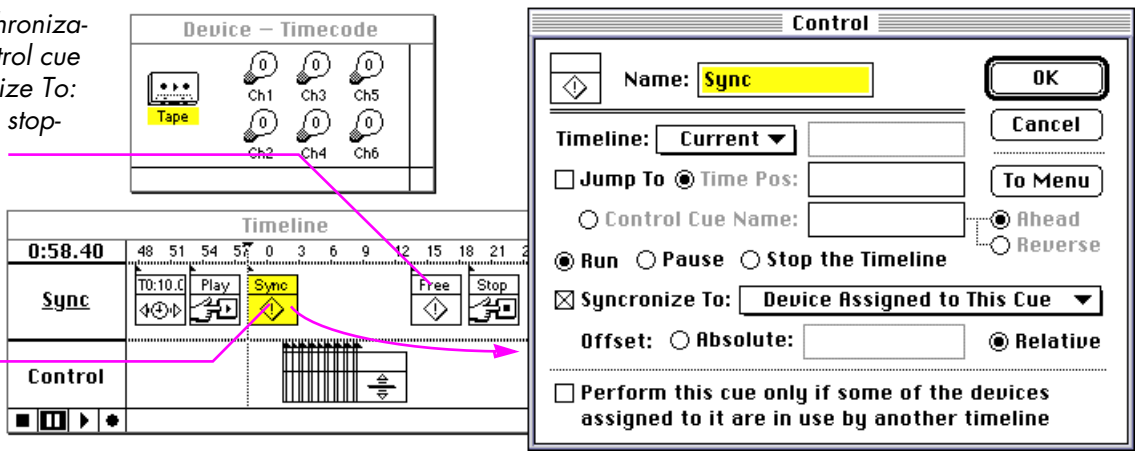
Most professional audio and video devices controlled using bi-directional, serial data (RS-232, RS-422 or similar) can also provide accurate timing information back to TRAX. This can be used to synchronize a timeline to the device while it is playing.

This is the reverse of what's described above, where TRAX was the "master" and the device the "slave". Which method to chose depends on the capabilities of the devices at hand.

To synchronize a timeline to a device, use a Control cue assigned to the device (see "Synchronize To" on page 214). Before synchronizing to the device, make sure the device is playing, for example by putting a Trigger Play cue just before the Control cue. Likewise, before stopping the device, use another Control cue to make the timeline free-running. See the enclosed tutorial show named "Timecode Synchronization" for an example of how this can be programmed.

Disengage synchronization using a control cue set to "Synchronize To: Nothing" before stopping the device.

This control cue activates the synchronization of the timeline, as seen in the dialog box.



Synchronizing to Timecode

Some devices – most notably analog audio tape devices – can't provide such inherent timing information, as described on the previous page. In order to control and synchronize to such devices, a separate timecode track is required. This can be recorded using TRANSPAX+, as described on page 375, and can later be read back in order to synchronize a timeline to the tape.

The method used to synchronize a timeline to the timecode on the tape depends on the capabilities of your recorder. It also depends on the control cable (or absence of one) between the TRANSPAX+ and the tape recorder. Chapter 15 provides details on the various hardware configurations.

If your tape recorder is controlled using a LOCATOR ADAPTOR cable (i.e., it can locate an arbitrary position on the tape using the autolocator feature of the TRANSPAX+), you proceed as described under "Synchronizing to an Intelligent Device" on page 222. If you can't use the autolocator feature, you will have to position the device manually prior to starting it.

Once the tape is positioned appropriately, start it either using a Trigger Play cue (if you can control the tape recorder's basic transport functions), or manually. Use a Control cue to lock the timeline to the timecode coming from the device, as described under "Synchronize To" on page 214.

Synchronizing an Entire Timeline

When using timecode from a tape deck that can't be controlled by TRAX, you may sometimes want to synchronize an entire timeline – rather than a portion of one – to that timecode. You can then operate the tape deck manually, causing the timeline to follow as appropriate. This is common practice in traditional slide shows, where you typically use a single timeline driven by the timecode from an open-reel recorder which also contains the soundtracks.

This can be accomplished using a startup task that establishes the tape device as the sync source for the main timeline:

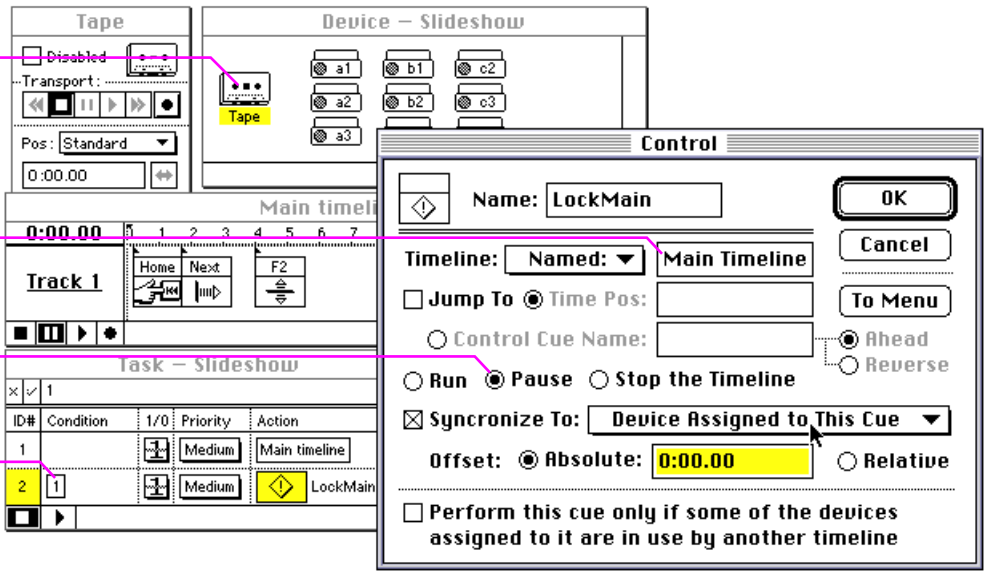
- Add a Control cue to the Task list, assigning it to the Tape device.
- Open the Control cue and target the timeline you want to synchronize using its name ("Main Timeline" in the example below).
- Put "1" into the Condition field of that Control cue task to make it auto-start.
- Press Command-space to run the system, causing the single-cue task to run, which locks the "Main Timeline" task to timecode from the Tape device.

Device used as sync source.

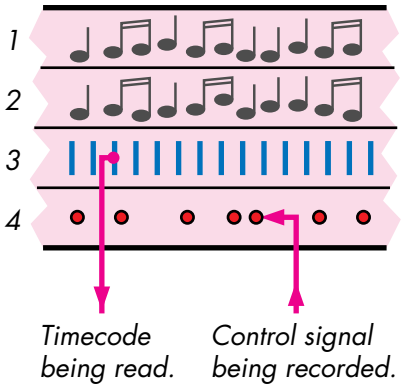
Name of target timeline.

Started in Pause mode, waiting for the timecode.

Put "1" here to make the Control cue auto-start (see "Making a Task Start Automatically" on page 58).



Recording a Control Track



You can record a control signal – also called a cue-track – onto a free audio channel. This control track can then be played back directly into the PLAY input of the first control unit in the chain.

You can record the control signal onto the tape containing your sound and the timecode track used for synchronization of the timeline. This is assuming that the recorder is capable of recording one track (the new control track) while simultaneously playing back another track (the timecode track). If this is not possible, you may instead record the control track onto another recorder, copying the soundtracks from the master recorder.

See "Control Signal Recording" on page 376 for more details on how to record and play back a control track using TRANSPAX+.

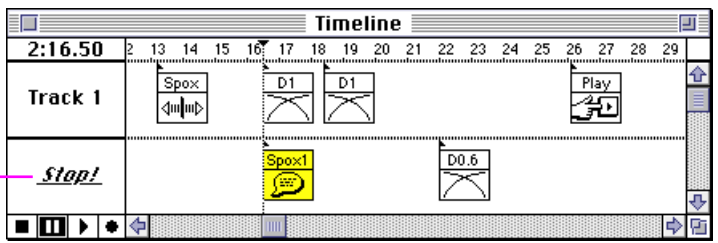
Speaker Support

A speaker support presentation is similar to a canned presentation in that it often uses only a single timeline. However, instead of running it from beginning to end at a stretch, it is typically run in smaller segments – sometimes as small as a single cue at a time – under manual control. The same applies to other kinds of presentations involving some live elements, such as dancers or an orchestra. In these cases, the timing and sequence of events may vary from one presentation to the next, and often can't be fully determined in advance. Depending on the circumstances, you may want to slow down the TRAX part of the presentation or speed it up. It is also possible to have optional show parts which can be skipped entirely or presented in any order.

Timing of Events

There are two ways to regulate the pace of the TRAX-controlled aspects of the show; you can force TRAX to skip ahead on the timeline or you can have TRAX stop at predetermined points and wait for a speaker or operator before proceeding.

To make TRAX stop and wait, use one of the tracks in the timeline as a stop-track. Lock the current track selection so it can't be changed by mistake. Put each cue at which TRAX should stop on this track. During your presentation, use the down arrow key on the computer's keyboard to run to the next cue on the stop track (make sure the timeline window is the active window).



Track being used as a stop track. Lock the stop track as described on page 105 to prevent it from being changed accidentally. When the current track is locked, its name is italicized.

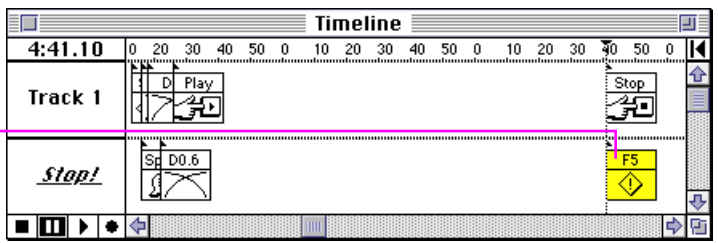
The top outsize button on the Dataton AIRLINK wireless remote control can be used in the same way as the down arrow on the Macintosh keyboard (see "Remote Control" on page 231). The up arrow key allows you to skip backward one stop at a time. The right arrow key lets you skip forward.

Skipping Ahead

You may want to skip ahead in a show if you have a time-continuous medium – e.g. videotape or CD – running until something else starts happening, the exact timing of which can't be determined in advance.

In this case, you would first program enough running time between the cues to cover the worst case situation at this point. You then put a named Control cue at the end of the running time. Put a function key or control key name into this Control Cue (see "Jumping to Show Sections" on page 230). When you run the show, simply press the assigned function key to skip ahead to this point as required.

- **NOTE:** As TRAX always searches forward when performing a QuickFind, you can use the same function or control key name at several points in the show to perform the "skip ahead" function.



Jump to the end of the video roll by hitting function key F5, or the corresponding key on an AIRLINK remote control.

Using secondary timelines

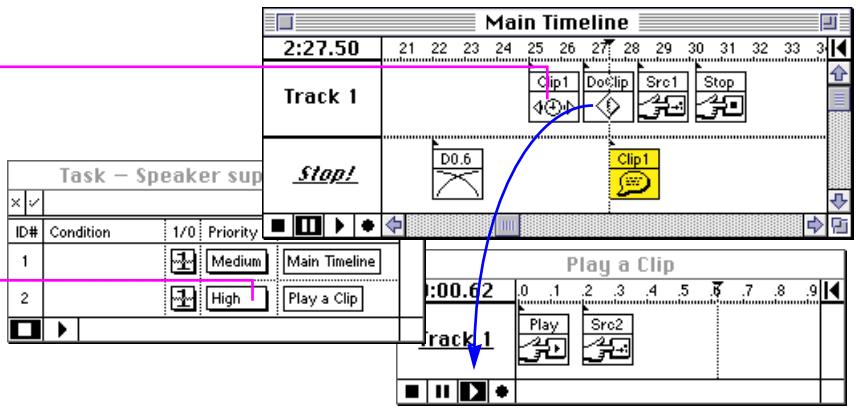
An alternative to the skip-ahead method discussed in the previous section is to use a separate timeline to run the video or sound clip, while the main timeline waits for the user to proceed. The advantage of this method is that it gives you greater control over the transition from the video/audio roll on to the following segment. Simply skipping ahead may be too abrupt.

This can be accomplished by running the video/audio from a secondary timeline, which is started by the main timeline using a Control cue. The secondary timeline contains the Trigger Play cue that starts playing the video, as well as any other cues required for the initial transition to the video clip. By putting the Locate cue that cues up this clip on the main timeline, you can use the same secondary timeline over and over to run different clips.

Configure the secondary timeline so that it stops automatically after the last cue (see "Stop After Last Cue" on page 105), allowing the main timeline to regain control over the device when it proceeds.

The Locate cue positions the device and the following Control cue starts the secondary timeline named "Play a Clip".

The priority of the secondary timeline must be higher than the main timeline's in order to take control over the device.



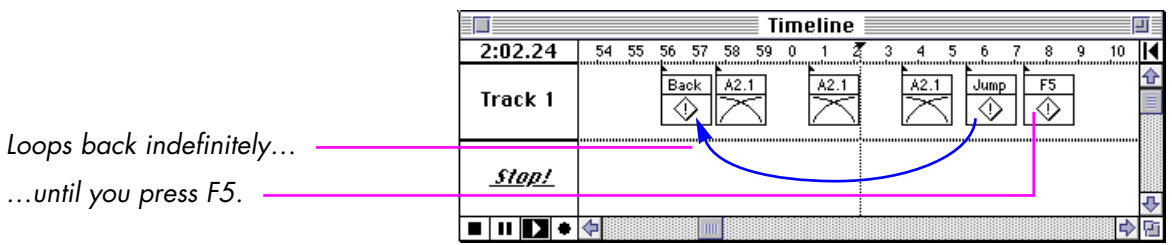
Programming Loops

In some extreme cases you may not be able to tell if the unspecified duration will be one minute or, say, three hours. All you know is that there should be some action going until you press a button. In this case, you can create a loop which will be repeated indefinitely until you press the skip ahead button.

Put a named Control cue at the beginning of the loop content. Then put another Control cue at the end of the loop telling TRAX to jump back to the named Control cue and run again. This will cause TRAX to repeat the segment between these two Control cues indefinitely.

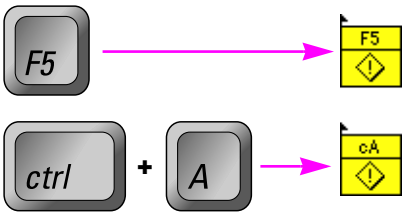
To get out of the loop, put a third Control cue after the loop, giving it the name of a function key or control key (see "Jumping to Show Sections" on page 230). Then simply press the designated key to exit the loop.

The third Control Cue may use the same function or control key combination as in other "skip ahead" cues as TRAX always starts a QuickFind in the forward direction (see "Using QuickFind" on page 88).



Alternatively, you can also use a secondary timeline for the loop, similar to the method described on page 228. This can provide better control of the termination of the loop.

Jumping to Show Sections



Some presentations may call for even more flexibility, requiring show segments to be chosen in any order rather than run in a linear sequence. This can be accomplished in various ways.

For example, using the QuickFind feature in TRAX, you can jump instantly to any point along the current timeline. This can be controlled from the AIRLINK wireless remote control or you can use function keys on the computer's keyboard as well as control key combinations. The bottom three rows of keys on AIRLINK correspond to function keys F5 through F13 on the computer's keyboard, giving you direct access to nine cue points in the show. You can use this feature of the AIRLINK even if your keyboard doesn't have function keys by simply putting the name of the key into the name of a Control cue. See "Using QuickFind" on page 88 for more details.

Another possibility is to use the Find command to locate any Control cue by entering its name (see "Find/Replace" on page 85). This has the advantage of offering even more cue points along the current timeline, with easy to remember names. The disadvantage is that it entails more typing than the QuickFind method, and it can't be used while the timeline is running.

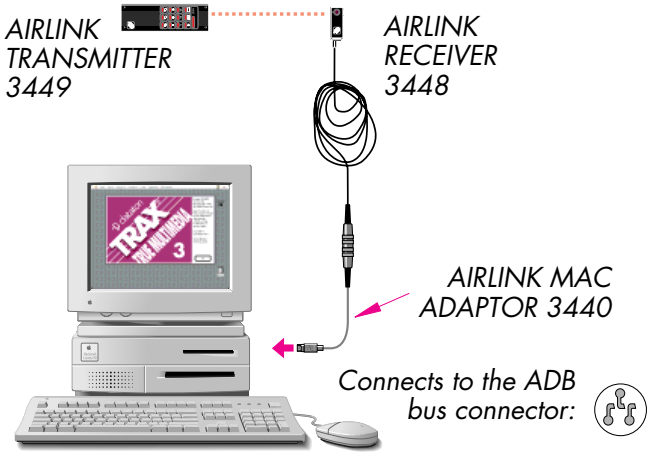
You can also insert programmed jumps into the show. This allows you to re-arrange the order in which the various segments are run without actually moving the cues around. Use a Control cue and select one of the Jump To options. Jumping to a named Control cue is preferable as it means you will automatically find the right spot in the show even if it is moved during editing.

Alternatively, modularize your show using separate timelines for each show segment, and then call these in the desired order from a main timeline (see "Using secondary timelines" on page 228).

- **HINT:** For even more interactive capabilities, please refer to Chapter 9.

Remote Control

To use the AIRLINK wireless remote control with TRAX for speaker support applications, connect the AIRLINK receiver to your Macintosh as described under “Connecting to the Computer for Speaker Support” on page 351.



The topmost, oversized key on the AIRLINK transmitter corresponds to the down arrow key on the computer’s keyboard. It will run the timeline up to the next cue on the current track (see “Timing of Events” on page 226). The three keys below correspond to the left, up and right arrow keys. Both the left key and the middle key in this row reverse to the previous cue on the current track. The right-arrow key skips ahead to the next cue on the current track.

The remaining nine keys correspond to the F5 through F13 function keys on the Apple Extended keyboard. They can be used in conjunction with the QuickFind feature (see “Jumping to Show Sections” on page 230).

Live Events

You can use TRAX to assist your crew for live events such as conferences, theatres, musicals, rock concerts, etc. These kinds of presentations typically combine the aspects of canned and speaker support presentations. Some segments may run totally pre-programmed, while others require manual control either by a speaker or an operator.

Such events typically call for lighting, sound reinforcement and playback, computer graphics, video projection and source switching, tape rolls, plus a number of operator cues that have to be performed manually for safety reasons or for increased flexibility.

Repeatability

One of the chief reasons for using a control system for live events is that it improves the repeatability of the performance. It is hard to achieve the same degree of precision when relying solely on operators and intercoms.

Even when the show actively involves people, such as in a theater, the repeatability makes their jobs easier because they know that they can rely on the system to perform consistently time after time.

Manual Control

While you can run the presentation directly from the computer, it is also possible to control it from remote locations, using for example TOUCHLINK or AIRLINK. Using multiple TOUCHLINK units, you can provide manual control, override functions and feedback to your operators. This allows them to manually control some aspects of the presentation, if required.

You can also use input signals to trigger functions automatically as an actor moves past a sensor. Or, for conferences, have the speaker control the pace of the presentation using a button on the lectern.

Modularity

The modularity of the system, both in terms of hardware and software, makes it suitable for live events.

For example, many conference-type events require equipment and crew both in the back of the room as well as behind the screen. Lighting and sound control is usually handled from the back of the room, where the operators have a good overview. Video rolls, projection and computer graphics, on the other hand, are typically run from behind the screen.

This can be easily handled by distributing the control units and operator panels as needed. You can run up to 100 meter (300 feet) of system cable between each control unit. The control units are powered locally, and the system bus has built-in protection from ground loops and other kinds of noise, resulting in a reliable system even under harsh conditions.

On the software side, you can modularize the show by using individual timelines to handle the various parts of the show. For example, the lighting can be programmed separately from the video. Or you can program each section of the show as a separate timeline. These timelines can then be assembled into the final presentation, and consolidated under a master timeline or started individually by operators.

Operator Prompting

In cases where you prefer to have an operator control a function – perhaps for safety reasons or to allow for improvisation – you can use Note cues to tell the operators what they're supposed to do and when to do it. These notes can be displayed either on separate monitors connected to the main computer or on TOUCHLINK panels, which can then be used for operator input as well. TOUCHLINK can also be used to indicate system status and provide other kinds of feedback to the operators.

Interactive Presentations

Your audience can interact with the presentation in many ways, thereby making it more responsive or tailored to specific needs. This can mean anything from a small kiosk-style presentation – used by a single person at a time – to a multi-floor visitor center using buttons, motion sensors or other kinds of inputs.

While traditional interactive applications – based on menus and branching – can certainly be managed by TRAX, you can also create more elaborate and complex interactions, typically not supported by other software packages. For example, using multiple timelines running asynchronously, you can choose new paths without necessarily stopping already started actions. It is also easy to provide other kinds of inputs than keyboard, mouse and touch screen. TRAX supports a variety of digital and analog inputs, as well as MIDI.

In addition to responding to the audience, you may want to exert a certain amount of control over the audience. For example, making sure they keep moving along a predetermined path or maze, while interacting with the system along the way.

Please refer to Chapter 9 for full details on how to create interactive presentations using TRAX.

General Media Integration

Although primarily designed for show applications, TRAX can also be used when you simply want to integrate a complex – and potentially confusing – set of equipment under a single system:

- Controlling the environment in a meeting room, including lighting, curtains, screens and sound levels, as well as various presentation media.
- Acting as a front end for an AV rack provided by a rental company, allowing the client to control some or all functions from a wireless remote or a touch panel.
- Acting as "glue" for devices that are not designed to work together.

Meeting Room Control

The use of AV media in the corporate environment has proliferated due to the widespread use of computer generated presentation graphics and multimedia, video projection, teleconferencing, etc. Although most of these media are almost infinitely flexible in terms of their applications, the practical implementations are often limited by poor integration or inflexible control solutions.

In order to get the most out of a room full of presentation equipment, start by defining the purposes of the room, such as:

- Board meetings.
- Sales and R&D meetings.
- Staff training.
- Customer training.
- Corporate presentations to customers, shareholders, school children, etc.
- Visits by sales people and others giving presentations in your facility.

Considering the many possible uses for such room, the variety of people that will utilize it and the amount of equipment needed, it's easy to see the need for control system to bring it all together. TRAX can run on a small computer installed in a rack together with most of the other sound and video equipment. TOUCHLINK panels can provide an attractive user interface. Separate buttons or hard-wired panels can also be linked to the system, if desired, through DIGITAL SMARTLINK. An AIRLINK remote control can be added for wireless remote control of selected functions.

The TRAX programming consists of a mix of direct control and timeline based programming. Most basic control functions can be accomplished simply by linking the buttons on a TOUCHLINK directly to the devices to be controlled (see "Linking Panel Items to Device Status Properties" on page 160). Pre-programmed presentations and sequences are handled by timelines (see "Timeline Window" on page 29).

AV Rental Applications

If you're in the business of renting out AV equipment to hotels and other venues, you can use TRAX, a few SMARTPAX units and an AIRLINK or TOUCHLINK to provide a consistent user interface to your equipment. This allows the client to control some, or all, of the equipment directly, or provides your crew with a more easily managed front end for commonly used functions.

Such an AV rental rack could include a sound amplifier, a CD player for walk-in music, an equalizer, video deck, wired and wireless microphones, and possibly a basic lighting dimmer.

Using the ability to directly link TOUCHLINK buttons and sliders to the functions to be controlled (as shown on page 160), you can put together the user interface in a matter of minutes – no coding required. Add your client's logo to the first page, and you have provided a tailor-made solution.

General Equipment Glue

Due to its open design, and ability to accept and provide a variety of control methods, TRAX can also be used as a general way of interfacing seemingly incompatible pieces of equipment. This allows you to integrate all kinds of devices in creative ways, using standard, off-the-shelf hardware and software components.

You could for example:

- Synchronize a computer-graphics presentation to timecode from an audio tape.
- Run multiple computer-graphics systems in parallel, to create electronic video-walls.
- Start a number of tape decks at the same time from a single push-button.
- Provide a custom-made user interface to control a number of different devices from one location using a single TOUCHLINK touch panel.
- Trigger MIDI-based sound effects and lighting from motion detectors and other sensors in the room.
- Play video clips off a laserdisc from a MIDI keyboard.
- Use some buttons on your lighting console to trigger sound effects from a CD player.

By using TRAX in a creative way, you can solve a number of control and interfacing problems that otherwise would require expensive, tailor-made solutions. This saves you time and money in the first place. Furthermore, once the job is finished, you can re-use the same equipment for other applications.

Staging Shows

Here is a basic checklist for staging a show using slide and/or video projection.

- Make sure you have at least one extra duplicate of the show tape and disk. You should preferably have an extra copy of all other unique material in your show as well (videotape, disks, slides, etc.).
- Carry some blank tapes and disks, spare lamps, slide mounts, etc.
- Make a detailed drawing of the entire system, showing how all the parts are interconnected, which addresses are assigned to which ports, etc. If the SMARTPAX units aren't installed in a rack, then mark them clearly so you know which unit goes where.
- Number slide mounts with their tray number and positions. Use a felt-tip pen and write directly onto the mounts – don't use labels as they may peel off and jam the tray.
- Check the room in advance. Are you going to use an existing screen? Is it large enough? Is it of the right material for your kind of presentation? Some screens may cause uneven illumination or hot-spots.
- If you bring your own screen, check the ceiling height to make sure it will fit.
- Figure out where to place your projectors. Place them high enough to avoid interference from people's heads. Make sure the table or shelf is rock-solid, and that no-one in the audience can sit, stand or lean on it.
- If you're mixing slides and video projection using regular three-gun CRT based video projectors, don't place the slide and video projectors close to each other as the magnetic field from the slide projectors will distort the video image.

- What's the projection distance? Do you have the right lenses to handle it?
- Check the room at about the same time of the day as your show will run to ensure that it's dark enough. Locate the curtains, blinds and light switches.
- If you can't turn all the lights off, for example, at an exhibition or a shopping mall, perhaps you should consider rear screen projection. This requires special screen material, as well as turning all the slides around 180 degrees. If you are using a video projector, check that it is capable of rear screen projection.
- Is there enough power capacity for your slide projectors? Figure out how many power-strips you need, then bring twice that number as well as some heavy-duty extension cords. If using PAX dissolve units, always power all projectors connected to the same PAX unit from the same outlet in order to avoid phasing problems (usually indicated by projector lamps that won't go off). This restriction doesn't apply to SMARTPAX.
- Are you going to use your own sound system, or plug into an existing system? Make sure the speaker cables are long enough, and tape them to the floor to avoid accidents. If you're going to tap into an existing system, check what kind of connectors are used. Bring some line-level signal transformers to break up any ground loops that may cause unexpected hum when connecting the two systems together.
- Give yourself plenty of time to set up. Rehearse everything thoroughly. Last but definitely not least, don't change a single thing in the system – not matter how simple it may seem – without re-doing the rehearsal!

Automatic Start

If the final presentation is to be run automatically from the computer, it can be set up in such a way that TRAX and the show are automatically loaded when the computer is switched on:

- Make sure "Start Automatically when Opened" is selected in the Preferences dialog box, then save the show (see "Start Automatically when Opened" on page 108).
- Put the show document, or an alias to it, into the Startup Items folder inside the System folder.

When the system is powered up, the show will load and the task window will be started automatically (i.e., set to its play mode). To make a timeline start automatically as well, put a "1" in its Condition column in the Task window (see "Making a Task Start Automatically" on page 58).

You can also use a password to protect the show so it can't be stopped by touching the computer's keyboard or mouse (see "Password" on page 113).

9 INTERACTIVITY

Many people associate the term "interactive" with CD ROM, computers and multimedia, allowing a user to view a presentation by pointing and clicking. Although this kind of presentation can be created using TRAX, the primary focus in TRAX is on interactive *environments* rather than just a computer screen. For instance, a visitor (or several) could enter a room to trigger an action; a musician could strike a chord on his synthesizer, or a performing artist could move over a sensor in the floor.

Individual inputs can be located throughout the environment. This can be anything ranging from simple push buttons through temperature sensors all the way up to the ubiquitous touch panel, including sound and graphics.

Multi-tasking Interactivity

Another major advantage of TRAX is its ability to trigger any number of independent actions, and have them perform at the same time. In most traditional interactive software authoring systems, you move along a single timeline, or through a menu tree. Having totally independent actions happening simultaneously is usually not possible in such systems.

However, when creating an interactive environment, such limitations are not acceptable. You may, for example, want to control lighting in one part of the room, triggered by a motion sensor. At the same time, another person could press a button in the opposite corner of the room to see a small slide show, while a third person wants to run a video clip. Such concurrent actions can easily be handled by TRAX through the Task list and using independent timelines.

Inputs

In order to create an interactive system you need to provide inputs to TRAX, such as a touch screen, an AIRLINK wireless remote, a MIDI keyboard or a hard-wired push-button.

Programming the Inputs

Most such inputs show up as Switch devices in the Device window. For some of these devices you must specify that it is an input, or a bi-directional signal, after choosing the device type (see "Input Switches and User Feedback" below).

You program the functionality of the inputs in the Task window. Add an action – either a single cue or a timeline – as described on page 51. Then link the Task's Condition to the Input On status property of the switch, as described on page 54.

See "Compound Conditions" on page 245 for more details on how to create more elaborate input conditions.

Input Switches and User Feedback

You can connect a push button or a toggle switch through a DIGITAL SMARTLINK connected to a SMARTPAX (see "DIGITAL SMARTLINK" on page 328). Due to the bi-directional capabilities of the DIGITAL SMARTLINK, the same wire can work both as an input for the button and as an output to drive an indicator in the button, providing feedback to the user. Such immediate user feedback is important in all interactive systems – in particular if the result of the user's input may take more than a few tenths of a second to appear.

Wire the switch to the DIGITAL SMARTLINK as shown under "Digital Input Functions" on page 331 or "Combined Input/Output Functions" on page 332. Add it to the Device window in TRAX, and set it either as "Input" or "Both" in

its configuration dialog box (see "Function: Output, Input, Both" on page 130). Select "Both" if you want to provide user feedback for the button.

▼ **IMPORTANT:** While the user feedback is activated (i.e., the output function of the switch device is on), it is not possible to detect any input signals. The switch's input status property will indicate that it is on (true) for as long as the feedback is activated. You must turn off the feedback in order to detect new user input.

If the button starts a timeline then turn on the feedback at the beginning of the timeline and turn it off at the end. In this way, the indicator will not only show that the sequence is started, but also when it is finished.

If the button is part of a group of buttons that represent a multiple choice – such as choosing a language – then the feedback in one button should be turned off when another button in the group is pressed. In this case, pressing the button while its function is already activated shouldn't have any effect, so it's OK for the button's indicator to remain on indefinitely.

Sensors

Various kinds of sensors can be wired through a DIGITAL SMARTLINK in the same way as described in the previous section. This includes for example most infrared motion sensors of the kind often used for burglar alarms, as well as limit switches, magnetic door sensors, etc.

When using electronic sensors, you must determine if the output from the sensor is galvanically separated from the electronic parts of the sensor itself. This is usually handled by a relay at the output of the sensor. In this case, it behaves just like a switch closure, and can be connected to DIGITAL SMARTLINK in the same way.

Using Electronic Sensors

Some electronic sensors may provide an output that is not separated, such as an open collector transistor output. You can use those outputs provided that:

- The open collector can pull a positive voltage of up to 12 V DC to ground.
- The ground of the open collector output can be wired to the ground terminal of the DIGITAL SMARTLINK without causing a ground loop or other unwanted current path.

Provided these criteria are met, you can wire most open collector outputs in the same way as a switch that closes to ground, using a pull-up resistor as shown under "Digital Input Functions" on page 331.

Wireless Remote Control

You can use an AIRLINK wireless remote control as an input. Connect the AIRLINK RECEIVER to a SMARTPAX port and configure it as described under "Connecting through SMARTPAX for Interactive Applications" on page 353.

Each button on the AIRLINK will appear in the Device window as a separate input switch. Link task starting conditions to the switches as desired.

MIDI

A MIDI keyboard, pedal or continuous controller (fader, wheel, etc.) can be used as an input. For keyboards and other MIDI devices (including some lighting consoles) add a Switch device for each input, choose "MIDI:Note Input" on the Type pop-up menu in the device's configuration dialog box. See the device information database for more details.

Likewise, to read a MIDI Continuous Controller input, add a Level device and choose "MIDI:Control Change" on the Type pop-up menu. For such analog inputs, you need to use one of the relational symbols and a threshold value to determine when to start the associated task.

Compound Conditions

You may sometimes want to combine multiple inputs to create a more complex triggering condition. For example, you may want a task to be started when a button is pressed, but only if a specific sensor is also activated, or only if it's before five o'clock in the evening. Such conditions can be programmed into the Condition field of the task in the Task window, using the symbols on the Symbol menu.

The most common symbol in this case is the "and" symbol, which performs the task if both input signals are available. For example, to trigger a task if both the Sensor1 and Sensor2 inputs are on, enter a condition like this:

```
Sensor1:Input On & Sensor2:Input On
```

You can also use the comparison or relational operators. For example, to start the task when Sensor1 is activated and Sensor2 is not activated, do this:

```
Sensor1:Input On & Sensor2:Input On = 0
```

Or, assuming you have a system clock device named Clock, you could make it start on Sensor1 provided it's before 5:00 PM:

```
Sensor1:Input On & Clock:Time < 17:00:00
```

See "Conditions Based On Multiple Status Properties" on page 54 for more details.

Touch Panels

A TOUCHLINK touch panel provides the ultimate flexibility in terms of user interface. You can use buttons like you use hard-wired input switches. You can also use sliders to control analog values, such as light or sound levels. Feedback can be provided to the user b y highlighting buttons and indicators as their functions are activated or using bar graphs showing analog values. You can also use sounds, numeric readouts, text and graphics.

Furthermore, TOUCHLINK also contains a motion sensor, which you can program to perform any system function when activated. The red buttons on the right hand side of TOUCHLINK can be programmed in the same way.

The following sections provide some examples of how to use TOUCHLINK. Please refer to Chapter 6 for more details.

Buttons and Sliders

A button on a TOUCHLINK can be used in the same way as a hard-wired button. Follow these steps to create such a button:

- Add a Switch device to the Device window.
- Open its configuration dialog box and select “Virtual”.
- Draw the button on the panel.
- Link the button to the “Output On” status property of the virtual switch.
- Open the button’s dialog box and select the desired action (usually “Momentary”) on the Action pop-up menu.
- Link your task triggering condition to the “Output On” status property of the virtual switch device.

In addition to this indirect way of linking a panel button to a function, you can also link panel items directly to specific device functions. For example, if you

want to make a button start a tape deck, simply link it directly to the "Transport:Play" status property of the tape deck.

Analog, numeric or time status properties can be controlled either using buttons or sliders. When using buttons, you can choose any of the Action modes, for example make the value increase or decrease as long as the button is pressed.

For more information, see "Button" on page 163, "Slider" on page 170 and "Linking Panel Items to Device Status Properties" on page 160.

User Feedback

The importance of instantaneous and clear user feedback can not be overstated in interactive applications. Of course, the best feedback is that the user's input gives and immediate and apparent result. However, sometimes this is not possible for practical reasons. In this case, providing "tentative" user feedback on the touch panel itself is a good idea. Furthermore, the user's attention is focused on the panel when making the entry, so this is a good place to present some feedback.

There are two kinds of feedback you may need to provide:

- Immediate acknowledgment.
- Indication of progress.

The immediate acknowledgment can take the form of an indicator or the button itself lighting up, a sound being played, or a text message being displayed.

If there's going to be a noticeable delay before the desired action begins, or concludes, some kind of progress indication is also a good idea. This can take the form of a bar graph or a count-down text.

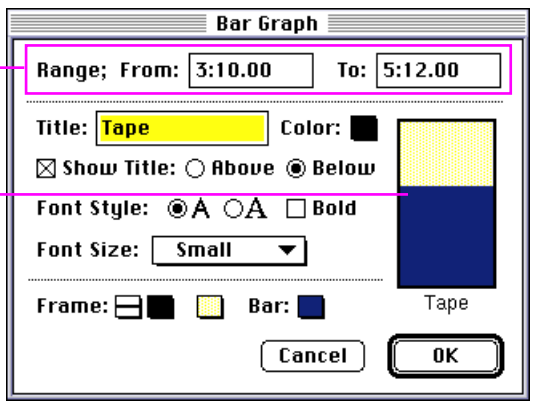
In case of delayed start, this indicates that the system is working on providing the requested action. It also gives a hint to how long it will take before something starts to happen.

For actions that will take a while to complete, such as a video clip, it can also be a good idea to provide feedback on the remaining running time. If the user can't tell whether such an action is going to take 5 seconds or 10 minutes to complete, this can make her feel out of control and possibly frustrated.

A TOUCHLINK touch panel provides several progress feedback capabilities. You can use a bar graph or a display field linked to a time or numeric status property of a device. For a video clip, for example, you can provide running-time feedback by linking a bar graph to the Time Position status property of the video player itself, and setting the starting and ending times of the clip as the range of the bar graph. See "Bar Graph" on page 171 for more details.

Specify the tape range to be indicated here.

The indicator can be oriented horizontally or vertically on the panel. The sample in the dialog box, however, is always shown vertically.



In the same way you can also use a display field to show numeric information. Do this by linking the display field to the status property to be shown.

Sound feedback can be provided by the Indicator panel item, which can also light up to indicate the status of some function. It is similar to a button, but doesn't respond to the user pressing it. See "Indicator" on page 168 for more details.

To provide text messages, link the display item to a Text device. Use Note cues assigned to that Text device to provide the text to be displayed. You can fine-tune the look of the display inside the display item's dialog box. See "Display" on page 172 for more details.

If there's no suitable device in the device window that can provide the feedback information, you can add a virtual timer or counter device (see "Timer" on page 259), and link the indicator to that device.

Graphics

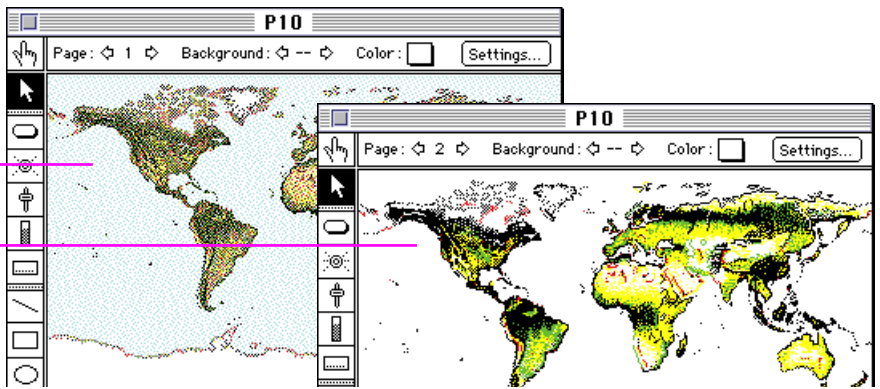
TOUCHLINK supports both basic graphics elements – such as lines frames and backgrounds – as well as graphics imported from other programs.

To add basic graphic elements, draw using the last four tools in the tool-bar of the panel window. These graphics can be further customized after drawing them by double-clicking the graphic and adjusting the settings in its dialog box. See "Line, Frame and Oval" on page 174 for more details.

When importing pictures from other programs using cut and paste, you may use either monochrome (i.e., black and white) graphics or color pictures. For monochrome pictures, you can set the color of the "black" and "white" pixels in the dialog box displayed by double-clicking the picture. Furthermore, the "white" pixels can be designated as transparent, allowing the background color or other pictures to shine through (see "Picture Options" on page 176).

Color pictures can not be made transparent in TRAX. If desired, use a paint program to create a composite of the graphics and the desired background before pasting it into TRAX.

TOUCHLINK has a fixed color palette consisting of eight basic colors. Thus, when rendering color graphics, TRAX will either use the closest color or a mix of colors that approximate the desired color. Which method to use is specified by the picture itself, and is determined by the program that created the picture. For greater control of the resulting colors, you may also choose to render the color picture in a separate graphics program, after specifying a palette of only these eight basic colors: black, white, red, green, blue, cyan, magenta and yellow. Please refer to the documentation of the graphics program for details on how to set the palette and determine color rendering options (often called "dithering").



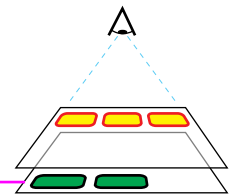
A picture using dithering to approximate the desired colors using alternating pixels. This may result in a grainier look.

The same picture without dithering uses the closest possible colors, sometimes resulting in poor color fidelity.

Pages

In designing your panel's user interface, you may want to limit the number of options presented to the user at any one time. This reduces the perceived complexity of the system, and can also be used to guide the user in a desired direction.

Use separate pages in TOUCHLINK to group related options. You can use a button to go to another page (by linking the button to the page number status property of the panel itself, as shown on page 160), or you can use a cue in a task or along a timeline to control it programmatically.



Sometimes you need to present the same basic set of options across a range of pages. This could, for example, be a common background picture or a button to return to the previous menu level. Then use a background page to hold all those common elements. Select that background page using the "Background" arrows on the foreground page. When the foreground page is displayed, the elements from the background page will also be shown, and can be operated in the same way. See "Pages" on page 157 and "Background Pages" on page 159 for more details.

Virtual Devices

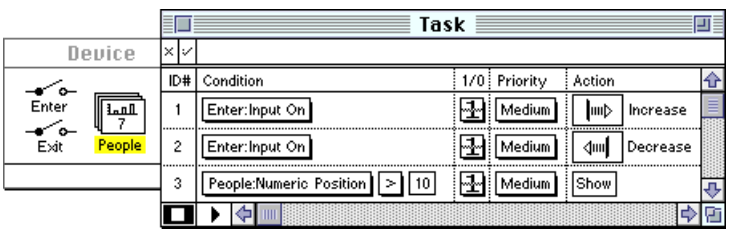
In addition to the real devices in your system – such as a lighting dimmer or a video player – TRAX also provides virtual devices. These devices behave just like real devices from TRAX' point of view, but they don't have any physical counterparts in the system.

Such virtual devices serve two main purposes:

- They can keep track of some system status that isn't provided by a real device.
- They allow panel items to be linked directly to starting conditions of tasks.

System Status Tracking

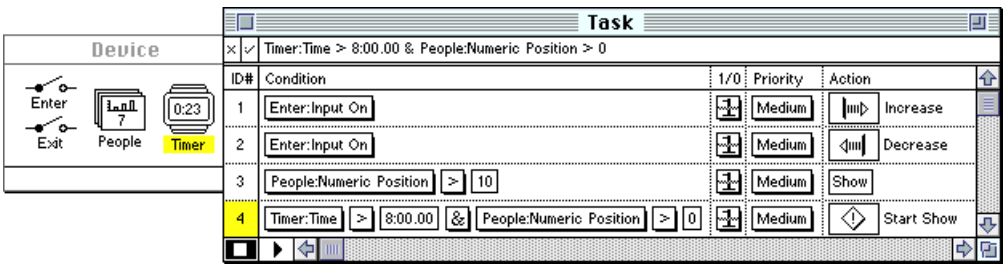
You can use a virtual Still Store device, for example, to track the number of people in a room. By referring to this virtual device, you could start a task when the number of visitors exceed a certain limit. The value of the virtual Still Store visitor-counter can be increased and decreased by turnstiles or other sensors at the entrance and exit doors.



In the example above, you can see the counter named "People". Note that its counter value is displayed in the icon. You also see the two sensors at the entrance and exit. In the Task window, you see the cues that increase and

decrease the counter when the inputs are activated, as well as the timeline that's started when the number reaches 10.

In this case, you may also want to keep track of how much time has elapsed since the show was last started, and then start the show if it's more than 8 minutes ago, provided that there's someone in the room, even if there are fewer than 10 people. This can be accomplished by using a second virtual device, acting as a timer (see "Timer" on page 259). This timer will be re-started from zero at the beginning of each show. You can then add a task to the task list consisting of a single Control cue that will start the main show timeline when the elapsed time is more than 8 minutes and there's someone in the room.



Panel Item Linking

You can control device functions from a panel by linking the buttons and other items directly to the devices to be controlled. However, sometimes you may want to start a more complex action, or a sequence of events, rather than just controlling a single device. This can be accomplished using a virtual device as an intermediary between the panel item and the task.

For single buttons, use a virtual Switch device. Link the button to the switch, and set its Action pop-up menu as follows:

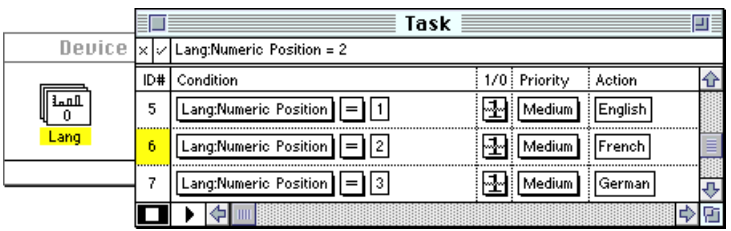
- Use "Set To" when you simply want the button to start a task. Put a cue on the timeline to turn the switch off again.
- Use "Momentary" if you want an action to be performed for as long as the button is held down, or to activate single-cue tasks. To make the task run repeatedly as long as the button is being held down, select "While True" in the Task window.
- Use "Toggling" if you want different actions to be started when turned on and off. Select "Becomes True" and "Becomes False" in the Task window to specify whether the action is to be started when the button is turned on or off.

Multiple Choices

Use a virtual Still Store device to manage a set of buttons representing a multiple choice selection, such as a language menu including English, French, German and Spanish. Make one number represent each language; e.g. 1 is English, 2 is French, and so on. The numeric value 0 can in this case indicate that no choice has been made yet.

Link all the language selection buttons to this virtual Still Store device, select "Set To" on the Action pop-up menu in each button's dialog box, and enter the number corresponding to each language in the field next to the Action pop-up menu.

To start the desired action based on the user's choice, test the value of the virtual Still Store device in the starting conditions for the tasks using the "Is Equal to" symbol, specifying the number of the appropriate language choice.



Feedback to Panels

You can use virtual devices to provide feedback information through the panel:

- Use a virtual Still Store or Time device in conjunction with a display or bar graph item as a clock, countdown timer or progress indicator.
- Use a virtual Text device to put messages into display fields.
- Use a virtual Switch device to turn a simple indicator on or off.

If using several pages, or more than one panel, you can provide the same information on them all by simply linking their items to the same device status property. When the status of the device changes, this will be automatically reflected by all panel items linked to that device status property.

Timing

TRAX excels at combining event-based and time-based actions – more traditional interactive authoring tools typically only provide the former. In addition to the precision timing provided by timelines, you can also have actions occur based on time-of-day, calendar or user-specified timers.

Precision Timing

Use one or many timelines when actions must be triggered with the highest possible timing precision. Those actions, represented by cues along the timelines, can be placed with an accuracy of 0.01 second (one hundredth of a second). See Chapter 3 to learn more about timelines.

Furthermore, a timeline can be synchronized to any device in the system capable of supplying timing information. This provides excellent long term precision, as the timeline will track the external device even if its speed varies slightly, or drifts over time. See "Synchronizing to an Intelligent Device" on page 222 and following pages for more information on how to synchronize a timeline to a device.

The timeline is triggered by a starting condition in the Task window, just like other actions (see "Specifying the Starting Condition for a Task" on page 53). Timelines can also start each other using Control cues. When a timeline starts another timeline, you have the option of locking the target timeline to the originating timeline – making it perform more like an extension of the originating timeline – or to start it as an independent timeline. This is determined by the "Synchronize To" option in the Control cue used to start the timeline (see page 214).

Time of Day

Actions can be started at a certain time of day, using the clock built into the computer as a time source. To access this clock, add a Time device to the device window, and choose "Apple:Macintosh System Clock" on the Type pop-up menu. Name the device "Clock". See "Time" on page 152 for more details.

To start an action at a certain time of day, add the action to the Task list as either a single cue or a timeline. Then refer to the "Time" status property of the Clock device in the Condition field, as shown in the example on page 53.

- **HINT:** If you want an existing timeline to be started under a number of different conditions, simply add single Control cue tasks, each with its own starting condition. Specify the name of the target timeline and choose "Run" inside those control cues (see "Target Timeline" on page 212).

Date, Day, Month

You can refer to the date, day of week, month or year in the same way, using the same Time device as mentioned in the previous section. You can combine the time with, say, the weekday using an "and" symbol to trigger an action at a certain time only during specific days:

```
Clock:Mode:WeekDay:Saturday & Clock:Time > 9:00:00.00
```

Or, to trigger an action at 5:00 PM every day except during July:

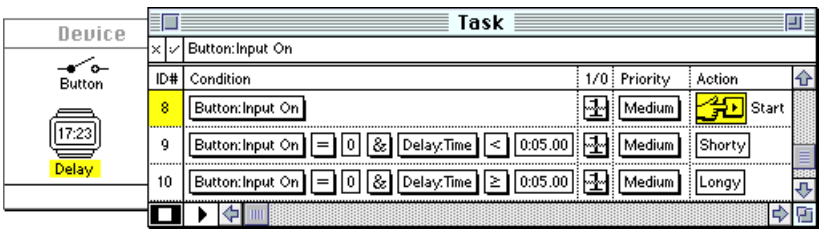
```
Clock:Time > 17:00:00.00 & Clock:Mode:Month:July = 0
```

See "Specifying the Starting Condition for a Task" on page 53 for more details.

Timer

You can use a virtual Time device to create a timer. That timer can act either as a countdown timer, or as a stopwatch. The current timer value can be displayed in a display item on a touch panel simply by linking the display item to the timer device.

You can also use timers for specific programming tasks. Let's say you want a button to start an action only if it's depressed for more than five seconds. If it's depressed less than five seconds, it should start another action. This can be handled by one timer and three tasks. The timer acts as a stop-watch, which is started when the button is pressed. When the button is released, either of two timelines are started, depending on whether the elapsed time is more or less than five seconds.



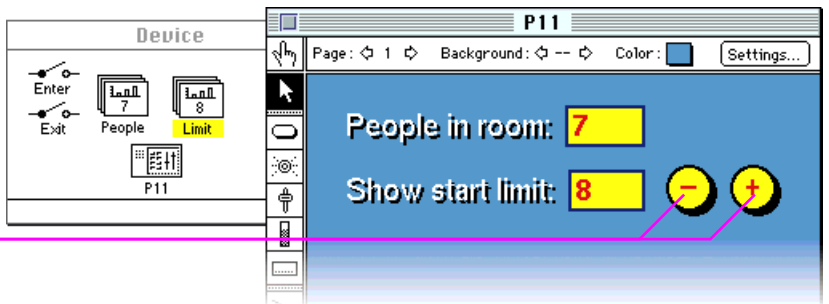
The first thing both the timelines do is to set the timer back to zero using a Locate Time cue, ready to be restarted by the button as soon as the timeline is finished.

Counter

You can use a virtual Still Store device in a way similar to the timer described in the previous section. This can be used to count the number of times a certain option is chosen, the number of visitors, or other statistics.

The value of the counter can be shown on a panel using a display item simply by linking the display item to the counter device. It can also be used to make decisions by including it in starting conditions for tasks. See the example under "System Status Tracking" on page 252.

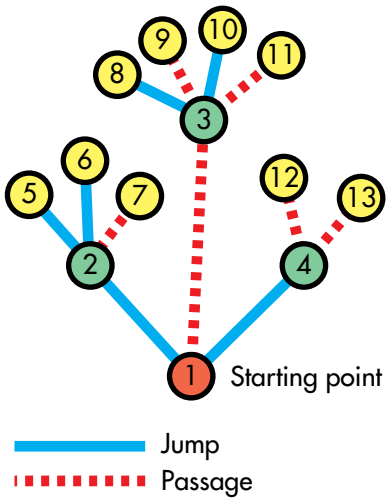
That example shows how the counter value is matched against a fixed limit. Sometimes it may not be possible to determine the correct limit in advance, but you may want to be able to adjust it as needed. This can be handled using two counters; one driven by the sensors and the other controlled by buttons on a touch panel. To do this, use virtual Still Store devices for the counter and for the limit value. Add cues triggered by the sensors to update the visitor counter, as shown in the example on page 252, and use two buttons on the panel directly linked to the limit counter. Choose "Increase" and "Decrease" respectively on their "Action" pop-up menus. Add display fields to show the current counter and limit values.



Buttons to adjust the number of people required to start the show.

Finally, adjust the task's starting condition to compare the visitor counter to the limit counter instead of a fixed value.

Branching



If you want to create a traditional, menu-based, interactive system – where the user is led through a hierarchy of selections – then use separate timelines for each branch. Such a system usually leads the user through a number of levels, with a choice to be made at each level. Generally, you should try to keep the number of levels – as well as the number of choices at each level – to a minimum to avoid confusion.

When designing such a system, start by drawing the menu structure. This is often depicted as a tree, where the starting point is at the root. Each branching point (node) is associated with specific information and buttons, usually presented on a touch panel. When the user makes a choice at a node, that will take him to the next node. This can be a direct jump, or it can be a "passage" which presents some information along the way.

Such an interactive presentation can be created in TRAX using a TOUCHLINK touch panel for the user interface. A TOUCHLINK page represents each node in the tree. Timelines run the "mini-shows" along the passages between nodes.

Most of the programming required for such an interactive presentation can be done in the panel window. Simply draw the pages representing each node in the tree, then program the buttons to jump to the desired pages or start the desired timelines.

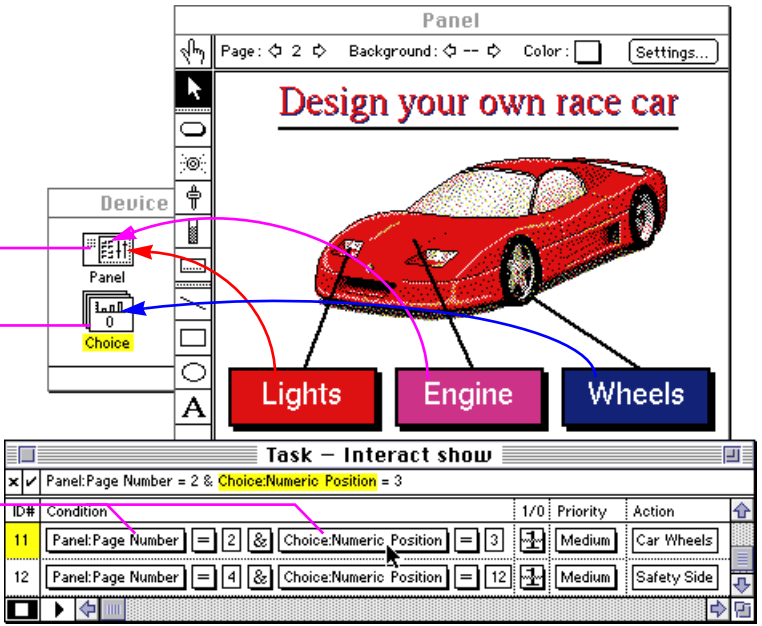
Buttons that jump directly to other pages can be linked to the page number in the panel's icon (see the picture on the next page). In the same way, you may want to provide a button that jumps back to previous pages. This gives the user a way out in case the wrong choice was made.

For buttons that are meant to result in the presentation of some information, link the button to a virtual Still Store device (see “Multiple Choices” on page 255). As the user can only be at one node/page at a time, you can use the same virtual Still Store device for all the nodes. Simply give each choice a number, and program the button to set the “choice” device to that number.

If a button simply jumps to another page then link the button to the desired page number of the panel itself. Open the button’s dialog box and enter the page number into the field next to the “Action: Set To” pop-up menu.

For buttons that should result in the presentation of some information, link the button to a virtual Still Store device.

Combine the page and the choice in the Task window to start the timelines when appropriate.



Use a timeline to create the actions according to the user's choice. As the starting condition for each such timeline you need to combine the page number with the choice number using an "and" symbol.

While running a lengthy timeline, it's a good idea to display another page on the touch panel, indicating that the presentation is running. This could provide a Stop button as well as some progress information for the presentation segment that is running. At the end of the timeline, return to the page that started it, and set the virtual "choice" device back to zero to re-set the choice buttons.

10 CREATING SERIAL DEVICE DRIVERS

This chapter describes how to create serial drivers to control devices equipped with an RS232, RS422 or MIDI control port. This is useful if you need to control a device for which there isn't any readily available device driver. The information in this chapter assumes a basic knowledge of serial data communication.

The Purpose of a Serial Driver

By creating a serial device driver, you can teach TRAX and SMARTPAX how to control a device for which there is no standard driver available. Although standard drivers are available for many devices, the ability to make custom drivers can prove useful if you quickly need to control a new device. Assuming that you have all the relevant information at hand, you can have your serial driver up and running in a matter of minutes.

Although a serial driver is simpler in its structure than most of the standard device drivers, it can still provide much of the power and functionality of a standard driver. For many types of devices, a serial driver's performance is good enough for all kinds of applications. Indeed, some of the standard drivers supplied with TRAX are made along exactly the same lines as a custom-made serial driver.

When you create a serial driver, you tell TRAX which commands the device can handle as well as which data bytes need to be sent to the device so that it performs these commands. Each command is given a descriptive name, which is later used when accessing the command from within a Trigger cue.

By grouping commands together into *modes*, you tell TRAX which commands work together and how. For example, most modern video projectors have several video inputs. In the serial data control protocol for the video projector, there are commands to switch between the various inputs. Although these are separate commands, they all affect the source mode of the projector. That's why it makes sense to group them together and collectively call them the Source Mode. The projector may have other modes, such as Stand-By which has only two commands: On and Off.

Grouping commands according to function makes it easier to use the driver. It also makes the operation of the device more reliable as TRAX keeps track of the state of each mode independently when jumping forward or backward along a timeline. This would be impossible if all commands were entered en masse.

ASCII Encoding

ASCII Char	*Binary Form*
SPACE	00100000
&	00100110
1	00110001
2	00110010
A	01000001
z	01111010

Examples of ASCII encoding.

There are many ways in which the data bytes sent to the device can be encoded. Many devices controlled through RS232 or RS422 serial ports use ASCII encoding for their commands. However, devices controlled through MIDI ports never use ASCII encoding. The methods described in this chapter allow you to create most kinds of serial data drivers, regardless of whether they use ASCII encoding or not.

ASCII stands for American Standard Code for Information Interchange, and is a standardized way of encoding alphanumeric information into computer data bytes, such as those transmitted over a serial data communication line. Serial drivers transmit such data bytes to the device being controlled. Each data byte consists of eight data bits. The table to the left shows some ASCII characters as well as their corresponding binary values.

You never need to deal with the data in its binary form when creating serial drivers. ASCII encoding is assumed by default. For devices not using ASCII encoding you can use HEX encoding to represent the data bytes.

ASCII and HEX are the most common ways of describing serial data. One of these two formats is normally used in the protocol listings that describe the communication language of a serially controllable device.

HEX Encoding

HEX Digit	*Binary Form*
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

HEX encoding is often used for devices that don't use ASCII encoding. HEX encoding is closer to the actual binary representation of the data. In the HEX encoding scheme, each eight bit data byte is represented by two digits with each digit representing four bits.

As four binary bits can accommodate sixteen different values, our normal ten digits are not sufficient to represent all 16 values. This is solved by simply adding six more "digits" at the end by using the first letters of the alphabet.

▼ **CAUTION:** Do not confuse the HEX digit A with the ASCII character A. They do not have the same binary value, as you can see in the tables.

As four bits can be represented by one HEX digit, it takes two HEX digits to represent an eight bit data byte. Hence, a byte is written as two digits. This table shows the ASCII character code, the binary value and the HEX value of some data bytes.

ASCII Character	*Binary Form*	*HEX Form*
Space	0010 0000	20
&	0010 0110	26
1	0011 0001	31
2	0011 0010	32
A	0100 0001	41
z	0111 1010	7A

To distinguish HEX bytes from normal characters, TRAX precedes each two digit HEX byte with a § sign, like this: §7A.

Before You Begin

Before you start making the driver, make sure that you have all the required information at hand, including:

- The actual device itself.
- The user's manual of the device, or someone thoroughly familiar with the device.
- The wiring of the serial port.
- The communication parameters of the serial port (data rate, stop bits, parity, handshaking, etc.).
- A complete and up-to-date list of all commands, showing either the ASCII characters or the HEX codes to be sent to the device.

Understand the Device

The most crucial aspect of creating a serial driver is the grouping of commands into modes. Before you can do this, you must have a thorough understanding of how the unit works as well as how it will be used in your application. If you're new to the device, spend some time getting acquainted with all aspects of the device, and how its various functions relate to each other.

Commands and Modes

It's a good idea to start with pen and paper. List all the commands you intend to use by writing all closely related commands down together. Each such group of commands is called a *mode*. Each command in a group sets the mode into a specific *state*. In a video projector, for example, the commands for the Input Mode could set it to one of the states Video1, Video2 and RGB. Modes typically consist of mutually exclusive states. Use a separate piece of paper for each mode. If you, when looking at one of these pieces of paper, find that two or more of the commands could very well be in effect at the same time, you will have to think again.

There are three typical kinds of modes:

- Modes with multiple states, such as the various video inputs on a video projector.
- Modes with only two states; typically On and Off. The Stand-By mode of the video projector would be a typical candidate.
- Modes with only one state that is augmented by a numeric value. This could, for example, be the Brightness mode of a video projector.

Combinations of the first and the third kinds are also possible. Indeed, in some cases, it is mostly a matter of taste if you decide to think of a mode as a number of independent states or one state with a numeric value.

Commands with Numeric Values

Consider, for example, a video projector which has an external video switcher. This is a common way to extend the capacity of high-end video projectors. The control protocol then typically includes commands to switch between the various internal video modules, and then an extended set of commands to switch to any of the inputs on the external switcher box. Assuming that the external switcher has six inputs, the Source Mode of the projector could be considered as having nine states, as shown in Table 1.

Video 1
Video 2
RGB
External 1
External 2
External 3
External 4
External 5
External 6

Table 1

Alternatively, you could view it as having only four states, of which the last state takes a numeric value specifying the input number on the external switcher, as shown in Table 2. Here <n> represents a number designating the input on the switcher. If there are only a few inputs on the external switcher, the first method may feel most natural. However, if the external switcher has 100 inputs, a list with a separate item for each input would be impractical. In this case, the second method is certainly preferable.

Serial drivers can handle all of those combinations, and then some, but it is essential that you figure out all such details before you start entering the commands into TRAX.

Video 1
Video 2
RGB
External <n>

Table 2

Hardware Interface

In order to get the driver to work, you must also have the appropriate cable available. In many cases, one of the standard Dataton RS232 or RS422 smart-links will work. This is the wiring of some smartlink cables:

SMARTPAX Signal	*Wire Color*	*3480 25-pin male*	*3486 15-pin male*	*3487 25-pin female*	*3487 9-pin female*	*3488 9-pin male*	*Device Signal*
4 TxD >	Yellow	3	3	3	2	8	> RxD
2 RxD <	Red	2	2	2	3	2	< TxD
5 DTR >	Green	5,6	—	5,6	6,8	—	> TxReady
1 Busy <	Brown	20	4	20	4	—	< RxBusy
3 RxGnd <	Orange	7	1	7	5	7	< Tx Gnd
8 TxGnd >	White	7	1	7	5	3,4	> RxGnd

In the table above, all the cables are for RS232 except 3488 which is an RS422 cable. The primary difference between RS232 and RS422 is that the former have a common ground-pin for both the transmit and receive signals while the latter have separate ground-pins. This makes RS422 more reliable when used over longer distances and at higher speeds.

The terms "male" and "female" refer to the gender of the plug at the device end of the smartlink cable. Thus, if the device has a female connector on the back, you need a cable with a male plug, and vice versa.

- **NOTE:** The table shown above is to help you select the correct cable for your application. It is not a complete wiring diagram of all the cables. Some cables may contain additional components.

The “<“ and “>” signs in the table indicate the signal direction. Thus, data is transmitted from SMARTPAX on pin 4 and is received on pin 3 by a device connected through a 3480 smartlink cable. The description of signal directions can sometimes be misleading in the documentation for devices, depending on whether the device is considered a DTE or a DCE. Look for indications of signal directions in addition to the names of the signals. An RS232 break-out box with LED indicators for the signals can be very useful when trying to figure out how a device is really wired.

The Busy input (pin 1 on the SMARTPAX port) is used to implement hardware handshaking (see “Handshaking” on page 275). This must be connected if the device uses hardware handshaking to signal when it is ready to receive more data. The DTR handshaking output signal from SMARTPAX pin 5 is not used by serial drivers.

If none of the cables above seem appropriate, you can make your own cable based on an AUXILIARY CABLE (product number 3450, see picture on page 339). This cable has the locking connector that plugs into the SMARTPAX already attached on one end and a “pigtail” on the other, ready for soldering your own connector. Avoid using other nine-pin connectors in the SMARTPAX end of the cable as they don’t lock securely into the SMARTPAX, which may cause reliability problems later on.

Data Rate, Parity, etc.

You also need to find out how to set parameters that determine the data signal format. Check the protocol manual for the device, looking for the proper setting for the following parameters:

Baud rate. Determines the speed of data transmission. Common values are 1200, 4800, 9600 and 38400. Sometimes this is switch-selectable on the device, in which case you should generally use the highest available rate.

Parity. This is a simple check bit that can be included with each data byte. Most devices don't use parity checking. If used, it may be either Odd or Even.

Data Bits. The number of information bits sent in each "packet" of data. Virtually all devices use eight data bits.

Stop Bits. Each data packet is surrounded by a start bit and a stop bit, to indicate its beginning and end. Some devices may require two stop bits, but this is very unusual.

Handshaking. This determines how the device signals it is busy to the SMARTPAX. Most devices don't use handshaking.

Delay. An additional delay that may be needed between commands. Most devices don't need any extra delay (see "Delay" on page 276).

Handshaking

Handshaking is sometimes used as a way for the device to tell SMARTPAX that it is currently busy and unable to receive any more commands. In this case, SMARTPAX can be configured to wait until the device signals it is ready, before sending the next command.

If the device requires handshaking, check which method is used. These are some common handshaking methods:

Hardware. A separate wire in the cable is used to signal that the device is busy. This has to be wired to the Busy input on the SMARTPAX (see "Hardware Interface" on page 272).

Xoff-Xon. A special character is sent by the device to signal it is busy. This is only used with ASCII-based protocols. The "busy" character is §13 (DC3) and the "ready" character is §11 (DC1).

Byte Echo. The device sends each data byte back to the SMARTPAX once it has received and processed it. Thus, SMARTPAX will automatically consider the device to be busy after each byte sent, until it receives a byte back. Note that the byte returned doesn't have to be the same byte as the one sent – any data byte will do.

Acknowledge. This is similar to the Byte Echo mode, but in this case the device sends a special acknowledgment byte or sequence of bytes back once it has completed the last command, which may have consisted of multiple bytes. This is sometimes called block-mode handshaking.

Delay

Some devices need extra time after a command before they will reliably execute the next command. This should ideally be indicated by handshaking. Unfortunately, handshaking is not always implemented, in which case adding some extra delay after commands can work wonders.

This is one of the trickier parameters as it is not always described in the manual for the device. You often only find out by trial and error that the device behaves unreliable if commands are sent too rapidly. If you do come across this, first double-check if the device supports any handshaking. If it doesn't, you must try to figure out how much extra delay is required between commands to make them work reliably. The delay time may vary according to the command.

Protocol Listing

Before you can start, you must make sure you have the complete and up-to-date command list of the device.

If any details in the protocol are unclear, try hooking up the device to a regular computer or a terminal and experimenting with the commands. This works best if the protocol is ASCII based. The protocol manual often contains the proper wiring for connecting the device to a PC or a Mac. Use a communications program to put the device through its paces. Make sure you set the communications parameters (baud rate, etc.) according to the device's specifications.

Points to watch out for when evaluating the protocol in this way are how the commands begin and end, and how numeric parameters are sent (if applicable). Some protocols use special lead-in and lead-out sequences, such as brackets, special control-characters or a carriage-return character. These are often discussed up front in the protocol listing and then omitted in the description of each command, which may be misleading.

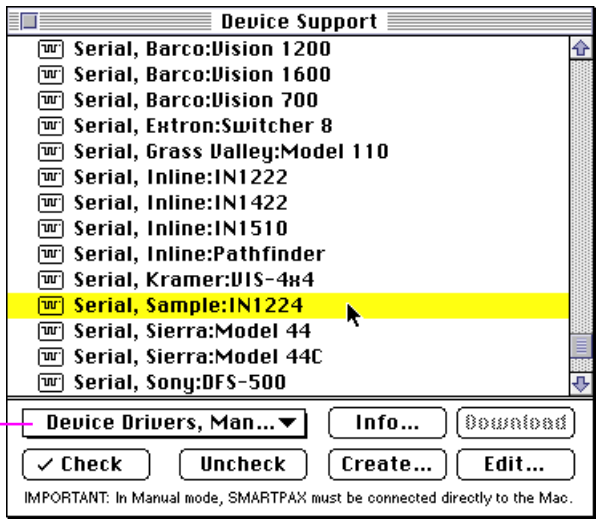
If some commands take numeric parameters, make sure you understand how they are sent. If ASCII encoding is used, and the number can be greater than nine, check to see if leading zeros are required for numbers that don't use all digit positions. Sometimes, numeric parameters are expressed as ASCII-encoded HEX bytes, again with or without leading zeros.

Binary protocols (i.e., non-ASCII) are the most complicated to evaluate as such data can't be easily sent using a terminal emulation program. Refer to the manual for the terminal program to see if and how non-ASCII characters can be sent. The proper formatting of numeric parameters in non-ASCII protocols can also be difficult to figure out. If you encounter problems, you're always welcome to contact your Dataton dealer. You can also use Dataton's HotFax technical support line at fax int+46-13-10 24 51, or send e-mail to support@dataton.se.

Editing an Existing Driver

To familiarize yourself with the look and feel of a serial driver, you can open one of the sample serial drivers included on the TRAX distribution disk. To open the driver, move it to the same folder as the TRAX application, then start TRAX by double-clicking the application program.

- **NOTE:** You can't open driver files by double-clicking the file itself. You must move it to the TRAX folder before you start TRAX, and then open it from within TRAX.



Select "Device Drivers, Manual Mode" to reveal the Create and Edit buttons.

1. Choose the Device Support command on the Window menu.
2. Select "Device Drivers, Manual Mode" on the pop-up menu at the bottom of the window to reveal the Edit button.
3. Scroll down to the serial drivers.
4. Select the driver you wish to open.
5. Click the Edit button at the bottom of the window to open the driver.

- **NOTE:** Only drivers that exist as separate driver files in the TRAX folder can be edited in this way. You can't edit any of the standard drivers built into TRAX itself. The Edit button is only active when you have selected an editable driver in the list.

Use the Settings button in the upper right corner of the serial Device Driver dialog box to see the communication parameters. Browse among the various modes and states in the two lists to see the data strings corresponding to the commands. For more details about a data string, click the Set/Change button at the bottom of the Device Driver dialog box. Finally, click Cancel to leave the Device Driver dialog box without saving any changes you may have made.

You can use this method to edit any drivers you have made, or drivers made by other TRAX users.

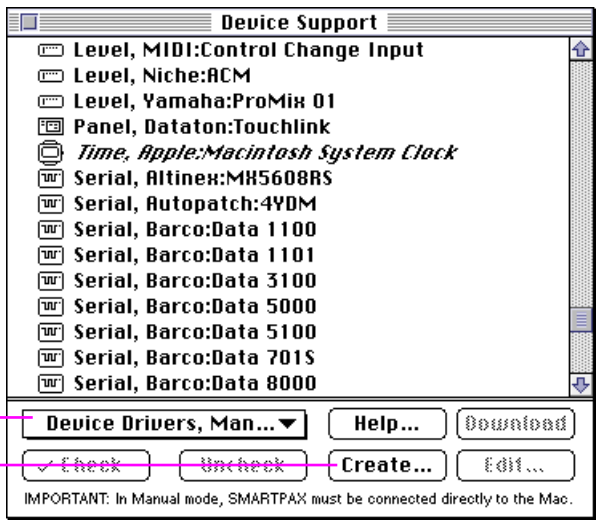
The next sections describe the driver editor dialog boxes in detail.

Creating a Driver

Our case study: the Inline IN1224 switcher/decoder/scan doubler.

This is a detailed description of all the steps involved in creating a serial driver. The IN1224 from Inline Inc. (La Habra, CA, USA) is used as a case study. This is a combined video/audio switcher and scan-doubler equipped with an RS232 control port.

To create a serial driver, start by opening the Device Support window via the Window menu. Select "Device Drivers, Manual Mode" on the pop-up menu at the bottom of the window. This reveals the Create button, located at the bottom of the window.

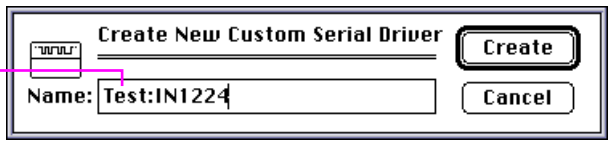


Select "Device Drivers, Manual Mode" to reveal the Create button.

Create button.

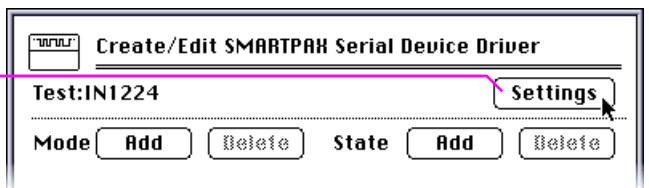
Click the Create button. This displays a small dialog box where you enter the name of the device for which you are about to create a driver. The name normally consists of two parts – the manufacturer and the model – separated by a colon. Enter "Test" instead of the manufacturer's name to avoid any conflicts with an already existing driver for this device.

Use a fake name here to not interfere with a name of an existing serial device driver.



The main dialog box of the serial driver editor appears. This is where you will enter the names of all the device's commands. Before you start entering commands, click the Settings button to configure the data-rate and other communications parameters.

Click the Settings button.



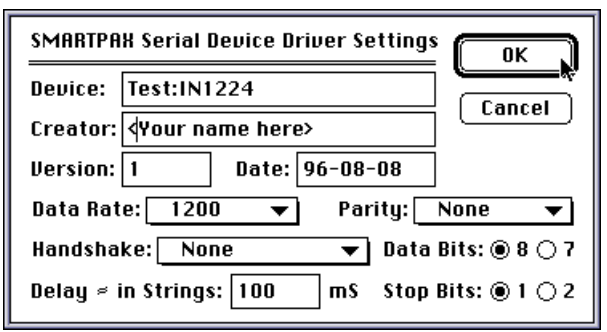
Driver Settings

The section about communications protocol in the technical reference manual for the IN1224 – our case study device – states

> *"8 data bits, 1 stop bit, No parity check, 1200 baud (factory default setting)."*

Incidentally, this matches the default settings of a serial device driver, so you don't have to change any of the communications settings. The Delay setting specifies additional delays that can be introduced into the command strings using the ≈ character. You can ignore this field in this case as we won't use this feature.

Our case study device features block-mode handshaking, acknowledging each command that is properly received and executed by sending OK back to the SMARTPAX. Block-mode handshaking isn't specified on the Handshake menu in this dialog box – it is specified by entering a special character into the command strings at the point where an acknowledgment is expected (see "Acknowledge" on page 310).



The following is a complete description of each field in the Serial Device Driver Settings dialog box.

Device

This is the name of the device driver, as it will appear in the list in the Device Support window. The name consists normally of two parts; the name of the manufacturer and the model name of the device being controlled. The parts are separated by a colon. Using the actual name of a device, rather than a generic name, makes it easier to find the right driver.

The colon in the device name also creates a hierarchical organization of drivers. This is used when choosing a driver with the DEVICE button on the SMARTPAX front panel (see "DEVICE Button" on page 322).

Note that you can't change the name of a driver simply by changing its file-name in the Mac OS Finder. When the driver is first created, the filename is based on the driver name you enter. However, owing to limitations in the Mac OS file system, file names are not allowed to contain colons. Hence any colon in the driver name is replaced by a space in the file name. You can freely change the name of the driver's file from the Finder without affecting the name of the driver itself. To change the name of the driver, open the Driver Settings dialog box and enter a new name.

- **IMPORTANT:** Do not move the driver file away from the TRAX folder. TRAX will not recognize driver files unless they are in the same folder as TRAX when the program is started.

Creator

Enter your name here.

When the driver is first created, TRAX automatically enters the name from the Owner Name field in the Mac OS "Sharing Setup" control panel.

Version

This number identifies the version number of your driver. You should update this number whenever you make any significant changes or additions to the driver. The version number is shown in the SMARTPAX display when the driver is selected using the DEVICE button on the front panel. If you have made enhancements to a driver, it's easy to tell which version is being loaded into a particular SMARTPAX unit by choosing it and reading the "DrvVer: xx" that's briefly shown in the display (see "DEVICE Button" on page 322).

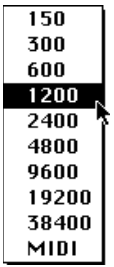
TRAX also uses the version number when choosing among multiple drivers having the same type and name. Although it is not advisable, it is possible to have two files (with different file names) containing a driver with the same name. In this case, TRAX will chose the driver with the highest version number.

The version number of any driver (custom-made or standard) can be seen by selecting the driver in the Device Support window and clicking the Info button. The version number and the name of the file containing the driver is displayed at the bottom of the scrolling text field.

Date

When a driver is created, Date is set to the current date according to the clock built into your computer. You may want to change this field if you revise the driver.

Data Rate



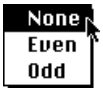
The Data Rate pop-up menu allows you to specify the data-rate – or "baud rate" – for communicating with the device. This must be set according to the device's specifications before the device will recognize any commands.

Some devices have switches or "jumpers" allowing you to set the data-rate. Generally speaking, you should set the highest data-rate possible on the device, and then configure the driver accordingly. In some cases, however, there's a factory default setting. If this is specified, then use this rate rather than the highest possible, as it will allow you to use a brand new unit if the old one should go down, without the need for re-configuring it. Furthermore, some devices may work less reliably at high data rates.

Some manufacturers put switches for selecting communication parameters inside their products. If you're having trouble communicating with a device, and can't find any switches on the back of the unit, check the technical manual for information about DIP switches or jumper settings.

The MIDI data rate at the bottom of the pop-up menu corresponds to 31250 bits per second, which is the standard rate used for MIDI data.

Parity



The Parity menu allows you to add a parity bit to the data bits of each byte transmitted. In most cases parity is not used, so you can leave this set to None.

Parity is a simple method of checking for communication errors on a serial data line. It was originally devised to catch single-bit errors in modem-to-modem communication over telephone lines. However, when controlling a device over a simple cable, such single-bit errors should never occur.

Some devices may still require parity, or may have the option of selecting parity using DIP switches or jumpers. In this case, set the Parity according to the manufacturer's recommendations.

- **IMPORTANT:** The parity setting of both the driver and the device must match, or the communication won't work at all. You can't improve the reliability of the data line by activating parity in the driver if the device doesn't support this.

Handshake

Many devices need some extra time to process each byte or command received from the SMARTPAX. Handshaking is a method by which the device can tell SMARTPAX that it is currently busy with a command and will notify SMARTPAX when it is through.

In this case, errors may occur if SMARTPAX insists on sending new commands to the device before it is ready. It is important that you select the right handshaking method for such devices. If a device does not require handshaking, leave this pop-up menu set to None.

The Hardware mode is the most reliable, and is preferred whenever possible. In this mode the device will activate a separate signal wire to tell SMARTPAX that it is busy. This signal must be connected to pin 1 on the SMARTPAX port (see "Hardware Interface" on page 272). SMARTPAX will not send any data to the device while pin 1 on the port is being held low in relation to pin 3.

- **IMPORTANT:** Make sure that the handshake pin is actually connected to a live "read/busy" output on the device before activating this mode. If the pin is not connected, or if there's no signal on the pin to which it is connected, SMARTPAX will not transmit any data at all.

The Xoff-Xon mode is similar to the hardware mode in concept, but is implemented in a different way. When the device becomes busy, it transmits a special "busy" command back to the SMARTPAX. This command is referred to as Xoff (HEX §13, ASCII DC3), and tells SMARTPAX to stop sending data to the device. When the device is again capable of receiving new commands, it signals this by sending an Xon command (HEX §11, ASCII DC1). This handshaking mode is not very common, though.

In the Wait for Echo mode, SMARTPAX will automatically assume that the device is busy after each byte sent, and await a byte back from the device before sending the next byte. Owing to the obvious risk for a deadlock if a byte is never received back (for example, if the device is temporarily switched off in the middle of a command) SMARTPAX will automatically resume transmission again after a time-out of ten seconds. This mode differs from the previous two in two ways:

- Handshaking is always performed for each byte sent by the SMARTPAX, not just when the device has received enough bytes to become "busy".
- It is initiated automatically, without any action required on the device's behalf.

Don't confuse this byte-level handshaking with the block-mode handshaking described next. Make sure a byte is indeed sent back by the device for every byte received before you select this mode.

Although not on the Handshake pop-up menu, there is actually a fourth method, referred to as block-mode handshaking. This is similar to the Wait for Echo mode, but here a response is returned for every *command* rather than every *byte* sent to the device. This is an important distinction since a command may consist of several bytes in a row. The response sent by the device after each command is referred to as an "Acknowledge".

The reason for not including this mode on the Handshake menu is that the desired definition of a command is sometimes different in TRAX compared to the protocol specification of the device being controlled. What appears to be a single command on the TRAX side may sometimes be a sequence of sub-commands, each requiring its own acknowledge byte, from the device's point of view. The ES-BUS protocol – commonly used for professional broadcast equipment – is a typical example of this, where each command consists of several, individually acknowledged, sub-parts.

To handle such situations, block-mode handshaking is evoked by including a special Acknowledge Request character in the command string. This character isn't sent to the device, but rather instructs SMARTPAX to stop sending further bytes at this point, and await a byte back from the device before proceeding (see "Entering the Command Strings" on page 302).

- **IMPORTANT:** When using block-mode handshaking, set the "Handshake" pop up menu to "None". Specify the handshaking in the driver strings using the Acknowledge Request character (see page 310).

Delay

Although handshaking is the most reliable method for ensuring that the device has enough time to process each command, not all devices support handshaking. In most such cases this simply means that the device is capable of receiving and processing all commands at full speed, without ever becoming "busy". There are, however, devices that are not capable of this and which do not support handshaking.

To handle such devices, extra delays can be introduced at the appropriate points in the data stream. As a general rule of thumb, devices performing some kind of mechanical action in response to a command need the time it takes to execute the task before they can receive any further commands. The same goes for commands requiring a lot of internal processing in the device, such as switching a video projector from one source to another, causing it to change its scan-rate.

▼ **IMPORTANT:** The Delay parameter by itself doesn't introduce any delay into the data stream. It simply specifies how long any delays will be. To actually introduce a delay in the data stream, insert the special Delay character at the desired positions in the string (see "Delay" on page 309).

If the device needs different delay times for different actions, enter the shortest delay time required into the Delay field and then use multiple delay characters in the string to obtain longer delays. For example, set the delay time to 100 milliseconds, and insert three successive delay characters to make a 300 millisecond (0.3 second) delay.

Data Bits

This setting determines the number of data bits per byte transmitted by the SMARTPAX to the device. You can choose between seven and eight data bits. Most devices use eight data bits. Don't select the seven bit mode unless explicitly stated in the protocol manual for the device.

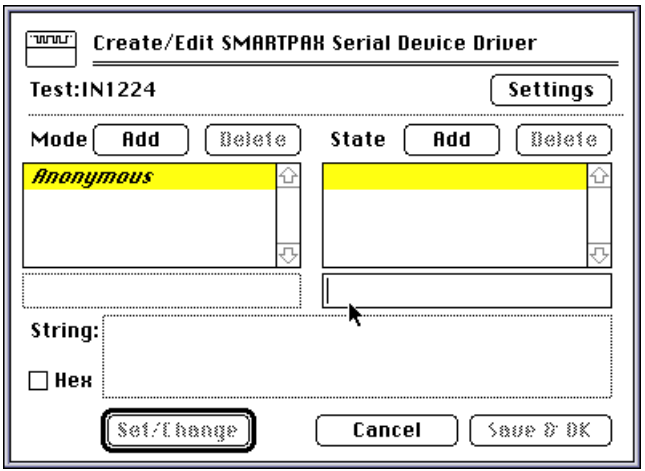
Devices using seven bit data typically use ASCII encoding of the commands. This is possible since the standard ASCII character set doesn't use more than seven bits to represent each character anyway.

Stop Bits

This is another seldom used setting. Most devices need only one stop bit. Adding a second stop bit generally doesn't hurt – it simply slows down the communication slightly. Indeed, selecting two stop bits can be used as a way to introduce a small delay after each byte sent. The delay time is fixed to the time corresponding to a single bit, which can be calculated by dividing one by the data rate.

Entering the Commands

Click the OK button in the Driver Settings dialog box in order to return to the main Serial Device Driver dialog box.



Main serial device driver editing dialog box.

Now it's time to start entering the names of the various modes and commands. To do this, you will need the pieces of paper carefully prepared for this purpose in the section titled "Before You Begin" on page 268.

Modes and States

Mode	*State*
Source	Video 1 Video 2 Video 3 RGB Bypass
Mute	Off On
Volume	Value <nnn>
Gamma	Curve <n>

Some of the IN1224 commands.

Once you're done with the paperwork, you can start entering the results into the Mode and State lists in the dialog box. In the "Before You Begin" section, you were encouraged to use a separate piece of paper for each logical group of commands. Put a title at the top of each of these papers, giving each group of commands the name of the mode they affect.

The list on the left shows some of the commands for the IN1224, with each group titled with the proper mode name:

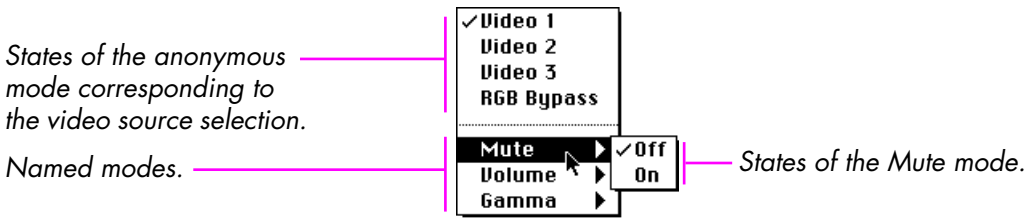
The names of the modes and commands have been chosen to be as descriptive as possible, in order to simplify the use of the driver. We're not yet concerned with the actual ASCII strings needed to perform these commands – only with the names of the commands and the modes which they control.

The names of the modes will go into the Mode list in the dialog box. Likewise, the names of each individual command will go into the State list. It is called a state because the command, when executed by the device, will cause the specified mode of the device to be set to that state. All the states within each mode must be mutually exclusive. For example, in the list to the left, the Source mode can only be in one of the possible states at a time – it is not possible to select both Video 2 and RGB Bypass simultaneously.

The Anonymous Mode

As you can see, there's already a mode in the list called *Anonymous*. Use this mode if the device has a primary mode, which is used more often than the others. In the IN1224 case, the Source mode is probably a good candidate. The states of the Anonymous mode will appear at the top level of the pop-up menu in the Trigger cue that will eventually be used to program the driver, thereby making them more accessible. States of named modes will appear on secondary menus. Except for this cosmetic difference, there are no differences whatsoever between the Anonymous and other, explicitly named, modes.

Assuming you would enter the states of the Source mode under the Anonymous mode, this is what the pop-up menu choices would look like;



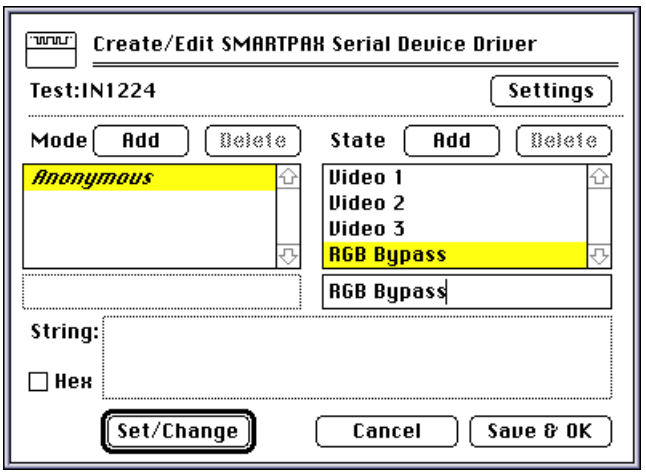
Named Source mode.

States of the Source mode.

If you decide not to use the Anonymous mode, but create a separate, named Source mode, the pop-up menu will look like the example shown to the left.

Again, there's no functional difference between using the Anonymous or a named mode. However, for devices that have one primary mode (or devices which have only one mode, like a simple video switcher with no other functions) using the Anonymous mode generally makes using the driver more convenient.

Assuming that you decide to use Anonymous for the various video sources, then enter the command names in the State list like this:

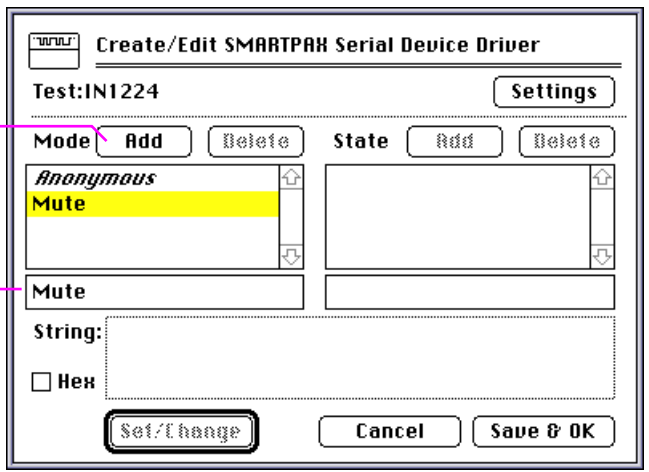


When entering the items of the State list, type each item into the text field below the list and press the down-arrow key. Do not press the Return or Enter key after each item, as this will open the Set/Change dialog box. If you do this by mistake, click the Cancel button in that dialog box to dismiss it and press the down-arrow key to continue entering the next state name. When you've entered all states of the Anonymous mode, the dialog box will look like the one shown on the previous page.

Continue by adding the Mute mode. Press the Add button next to the Mode title, type Mute and press the Tab key to get back to the State list. This list will now be empty, as there are no states entered into the Mute mode yet.

Click here to add a mode…

…then enter its name here.



Type in the two states Off and On for the Mute mode. Then continue with the other modes and their states in the same way.

The Default State

The order in which you enter the states in each mode is important. Specifically, the first state entered into each mode must match the default (power up) state of the device being controlled. The driver won't send any data to the device to set it to its initial state. It simply assumes that the power-on state of the device matches the first state of each mode.

Which state is the default one in each mode is often not clear from the device's protocol list. Check the user's manual for information about this, or try to figure it out from the device itself.

Some devices may have switches that determine the initial state of some or all of the modes. In this case, you must be particularly careful to ensure that these switches are always set in the way the driver assumes when turned on.

Of course, you can add cues at the beginning of each show that uses this device to set the desired initial state. This complicates the use of the driver, however, and should be avoided whenever possible.

Command Strings

Look up the description of the device's command protocol in its manual. At the beginning of the protocol description, there's usually some general information about the formatting and possible handshaking of the device. If you are lucky, there are also some complete examples of a full command sequence that will make the device do something useful.

The initial description is usually followed by a list of commands, sometimes with detailed descriptions of each command.Usually this list only includes the central parts of each command, where the standard parts – which are identical for all commands – are simply inferred from the general description of the protocol.

Protocol Format

The description in the technical manual for the IN1224 – our case study switcher/scan-doubler – is a typical example:

> *All commands sent to the unit must contain a leading code, the command code, and an ending code. Each command must be completely executed before the unit will accept a new command. When a command is completed, the unit provides a response code; "[OK]" indicates the command was received and executed. A complete command consists of:*
>
> | | |
> |---|---|
> | *[* | *The leading code* |
> | *CH4* | *The command code. In this case CH4 would select Input 4, the RGB input.* |
> | *]* | *The ending code* |
>
> *Sample command code:*
>
> | | |
> |---|---|
> | *[CH1]* | *Selects Input 1* |

This clear and concise description of the protocol format translated into TRAX terms means:

- The protocol is entirely ASCII based, you won't need to deal with any HEX or binary numbers.
- Each command must be enclosed within square brackets.
- Block-mode handshaking is implemented. The device will acknowledge each command by sending the ASCII characters [OK] back to the SMART-PAX.

Although there is a form of handshaking, this particular kind (block-mode handshaking) is not specified in the Driver Settings dialog box, as you may recall from the discussion of the "Acknowledge" handshaking mode on page 275. Instead, this kind of command acknowledgment is requested by adding a special character to the command strings (see page 304).

Command Strings

The IN1224 Technical Reference Manual lists the following command strings:

CH1	*Select Input 1 (power on default setting)*
CH2	*Select Input 2*
CH3	*Select Input 3*
CH4	*Select Input 4 - RGB Passive Input*
VOLxxx	*Set volume level to xxx value*
MUTE0	*Disable Audio Mute*
MUTE1	*Enable Audio Mute*
GAM0	*Disable Gamma Correction function (default)*
GAMx	*Select Gamma Correction curve x: 1 - 7*

- **NOTE:** This is not the full list, but only the commands relevant for this case study.

This list tells us the following important details:

- Most command strings are short, with no parameter values or other "extras."
- Some of the command strings do take a numeric value. The Volume command takes a three digit value. Also the Gamma command takes a value in the range one through seven (or zero through seven if you include the GAM0 command, which could be considered just one more of the GAMx commands).
- All the commands are indeed sequences of ASCII characters. Even the numeric values – where applicable – are encoded as decimal format ASCII-encoded data.
- The default (i.e., power-up setting) is Input 1 and Gamma Disabled.

Commands that belong together begin with the same characters, such as the commands CH1 through CH4 and GAM0/GAMx. This helps us group the commands into independent modes with mutually exclusive states, as shown in the table to the left.

Mode	*State*
Source	Video 1 Video 2 Video 3 RGB Bypass
Mute	Off On
Volume	Value <nnn>
Gamma	Curve <n>

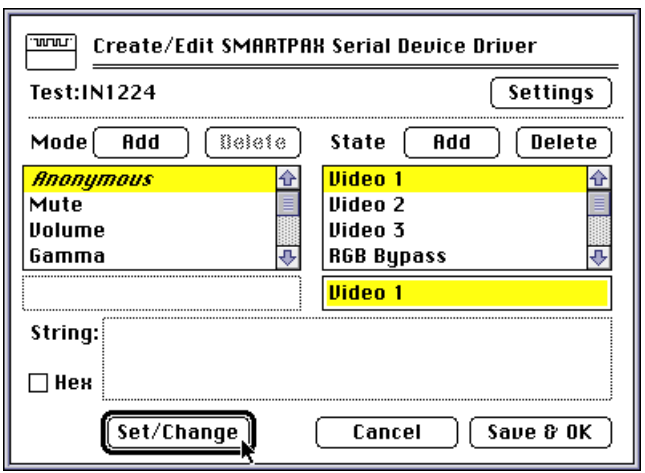
Numeric Values

The Volume and Gamma commands take a numeric value. In the Volume case, this value must have three characters – whether they are used or not – so leading zeros must be added for values less than 100.

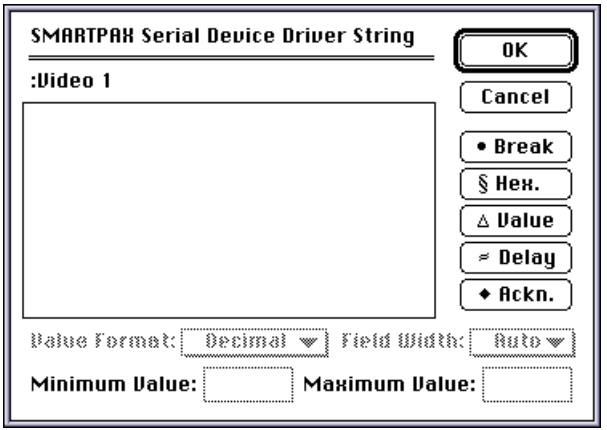
In a way, the Mute command also takes a value (zero and one). However, as there are only two values, it's probably better to give them descriptive names, such as Off and On, and treat them as separate commands.

Entering the Command Strings

To enter the first command string, select the corresponding name in the State list. As the channel switching commands are grouped under the Anonymous mode, you must first select this mode in the list to the left. Then select Video 1 in the list to the right and click the Set/Change button.



This displays the Serial Device Driver String dialog box.



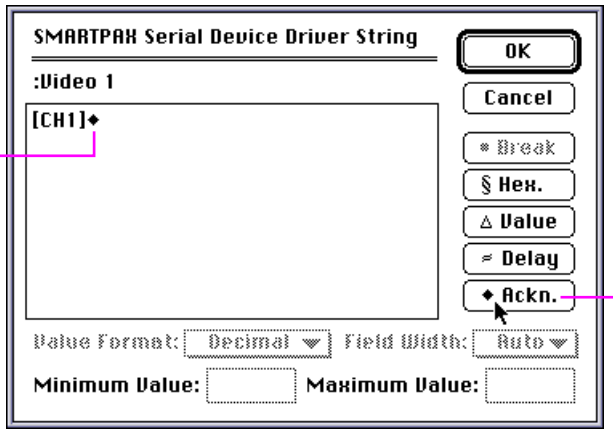
Enter the string corresponding to Video 1 in the text field.

▼ **IMPORTANT:** Don't forget to enter the brackets around the command, as specified in the overview section of the test device's protocol description.

Acknowledge Request

At the end of the string, you must enter the special character that tells SMARTPAX to stop and wait for the acknowledgment from the device. Even though this is at the end of the command, you must still instruct SMARTPAX to wait for the acknowledgment, as any following command must not be sent until this one has been acknowledged. Use the button to the right of the text field to enter the Acknowledge Request character at the end of the string.

Acknowledge Request character.



Click here to enter the Acknowledge Request character.

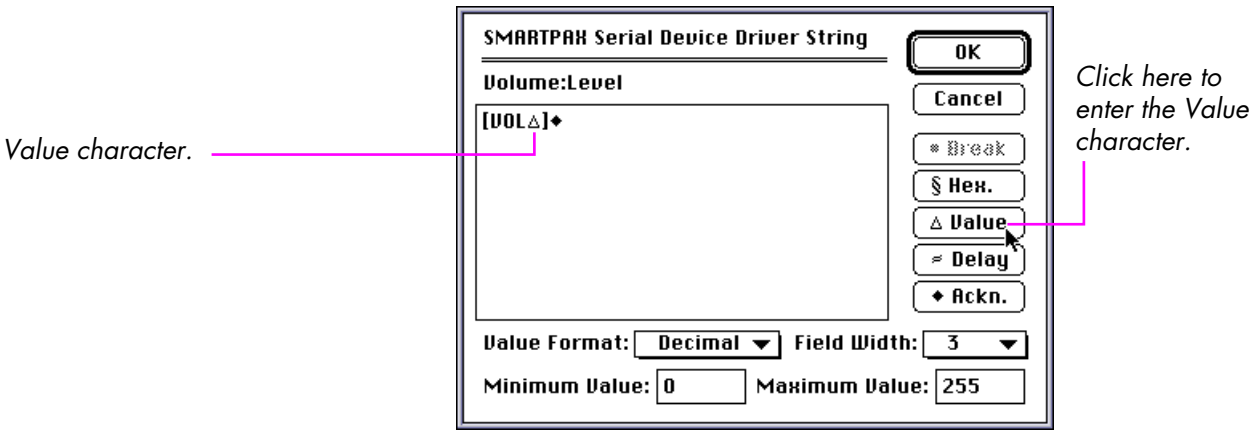
As the following command strings will look very much like this one, you can save some time by copying this command string and using it as a template for the next few commands. Select all the text in the text field, then copy it using the Copy command on the Edit menu.

Click OK to close the Driver String dialog box. Move down to Video 2 in the State list and press Return to open its dialog box. Paste in the string you copied from Video 1 and change it to select CH2. Continue in the same way with the other members of the Anonymous mode, entering the corresponding strings from the list under "Command Strings" on page 300.

When you have entered the strings for all the source switching commands then select the Mute mode in the list to the left. Enter the command strings corresponding to its Off and On states.

Numeric Values

Select Volume in the Mode list and open the Level state's dialog box. This command takes a numeric value. You can't enter all the characters in the command now as three of them aren't known until you eventually set the volume using a Trigger cue. Instead, put a Value character at the point in the command string where the number will go.



When you enter the Value character into the string, the fields at the bottom of the dialog box become available. Specify a field width of 3 characters and a minimum and maximum value of 0 and 255. The field width setting tells SMARTPAX that it must always put three characters at this point in the string. For numeric values less than 100, SMARTPAX will add leading zeros as required. If you leave the field width set to Auto, SMARTPAX will only include

as many characters as necessary to represent the number specified in a Trigger cue.

Examples:

Value	*Auto width*	*Width 3*
0	[VOL0]	[VOL000]
7	[VOL7]	[VOL007]
25	[VOL25]	[VOL025]
150	[VOL150]	[VOL150]

The Minimum Value and Maximum Value fields specify the permitted range for the numeric value. This will be used to enforce the values entered in the Trigger cues that will eventually control the device.

Close the dialog box and move down to the Gamma mode. Open its Driver String dialog box and enter the string. Enter the Value character after GAM and before the closing bracket. Don't forget to add the Acknowledge character at the end. Leave the Field Width set to Auto and set the Maximum Value field to seven.

Close the Driver String dialog box. Click Save & OK in the main dialog box to save the driver.

- **NOTE:** The Save & OK button is not available unless you have entered at least one state into the State list.

The following is a detailed description of all the items in the Driver String dialog box.

Break

• Break

This special character introduces an ES-BUS standard break. It can only be used as the first character in a string. ES-BUS is a common protocol standard for equipment used in professional broadcast applications. It normally uses the RS422 communications standard.

Hex

§ Hex.

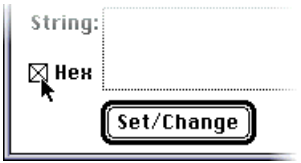
This special character causes the following two characters to be interpreted as a HEX-encoded data byte (see "HEX Encoding" on page 267). Use this to enter the data for non-ASCII drivers, such as drivers for MIDI and ES-BUS devices, which don't use ASCII encoding of their commands.

You can also use this button to enter control characters such as Carriage Return (CR), Line Feed, (LF), etc. These characters are sometimes used to delimit ASCII command strings. The table to the left shows some common control characters and the Hex format you would use to enter them into the string.

You also need to use this method for non-standard ASCII characters such as Å, Ä, Ö, Ø, ß, etc. The actual code for such characters varies depending on the character set used by the device. Look for a list of character codes in the device's manual.

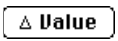
Character	*Hex*
CR	§0D
LF	§0A
STX	§02
ETX	§03
ESC	§1B
BS	§08
BEL	§07
HT	§09
VT	§0B
NUL	§00

Forcing Hex Format



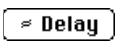
TRAX will, by default, display any data byte in the range §20 (space) to §7E (tilde) in its ASCII character form. Thus, even if you enter §41 into the string, TRAX will convert it into an A (§41 is the HEX code for the ASCII character A). Any data outside this range is always displayed in the §xx format. You can force TRAX to display *all* bytes in the string in HEX form by checking the Hex check box in the main Serial Device Driver dialog box. This is practical if you're working on a non-ASCII driver (for example to control a MIDI device), as it prevents TRAX from possibly displaying some data bytes using their ASCII form.

Value



This special character tells SMARTPAX to insert a numeric value at this position in the string. The actual numeric value isn't determined until you use a Trigger cue to activate this command. Use the fields at the bottom of the Driver String dialog box to specify the format and range of the numeric value.

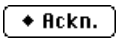
Delay



This special character introduces a delay in the data stream, which may be required by some devices. If you notice that the device sometimes fails to execute commands properly when sent in rapid succession, you should first look for any handshaking capabilities (see "Handshaking" on page 275). If handshaking is not available, you may still be able to adapt the driver to the device by adding the required delays.

The duration of the delay introduced by this special character is determined by the "Delay ≈ in Strings" field in the Driver Settings dialog box. Inserting multiple, successive delay characters increases the delay time by the corresponding amount. Different delay times may be required for different commands. The Delay character is typically only used at the end of command strings.

Acknowledge



This special character causes SMARTPAX to stop sending data to the device, and await a response before proceeding. This implements a form of handshaking known as block-mode handshaking. You may insert multiple Acknowledge Request characters into a string. You would normally only use this special character at the end of each command.

- **NOTE:** Do not use this special character unless the device's manual explicitly states that it sends a response back after each command. If the device fails to send a response, SMARTPAX will not send any more data to it for about ten seconds.

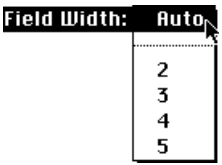
Value Format

This pop-up menu allows you to specify which format to use for the numeric value. The first two formats are ASCII encoded and the last two are binary. The decimal ASCII format is most common.

As some protocol manuals list each command as a sequence of HEX bytes, it is often difficult to tell whether you should use the hexadecimal format or the binary. In general, if the manual shows values as hexadecimal numbers and the other parts of the command consist of regular ASCII characters, you should use the hexadecimal value format. You must also specify the field width for the value. Common field widths for hexadecimal ASCII parameters are two and four.

If the entire command consists of HEX bytes (i.e., two character pairs, each preceded by a § character), it is more likely that the binary format is used for the value. MIDI is a typical example here, where most values (for example, note numbers) are encoded as binary data bytes in the range 0–127 (i.e., §00–§7F). In this case choose either Byte hi/lo or Byte lo/hi. The hi/lo format causes the most significant byte of multi-byte values to be sent first. In the lo/hi format, the least significant byte is sent first.

Field Width



The Field Width pop-up menu specifies the width of the numeric value, in characters. In the Auto mode, the field width will be automatically adapted to the number of significant digits in the value. Many devices, however, require a fixed number of digits when supplying numeric values as part of commands. In this case, specify the required number of digits using this pop-up menu. SMARTPAX will then add leading zeros as required when sending the numeric value to the device.

Make sure the width you specify is wide enough to hold the largest value. If you specify a width of, for example, 3 characters and then send 1000 as the numeric value, SMARTPAX will not be able to express the value correctly. You can prevent this by limiting the maximum numeric value using the Maximum Value field.

Minimum and Maximum Value

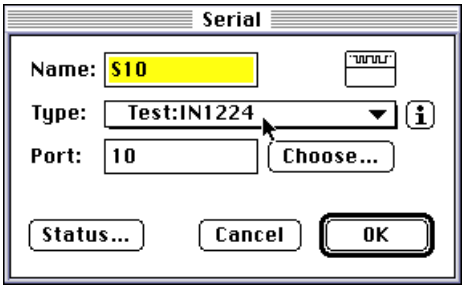
These fields allow you to specify the minimum and maximum values that will be allowed when using this command from within a Trigger cue. Use this feature to limit the range of values according to the device's protocol specifications.

Downloading the Driver

Once you have added all required commands to the driver, click "Save & OK" in the main dialog box. Connect the SMARTPAX to your Mac and to the device to be controlled. Download your new driver by clicking the Download button in the Device Support window. See "Downloading in Manual Mode" on page 69 for more details on selecting and downloading drivers.

Using Your Driver

To use your new device driver, add a Serial device to the Device window, open its dialog box, and choose your new driver on the Type pop-up menu.



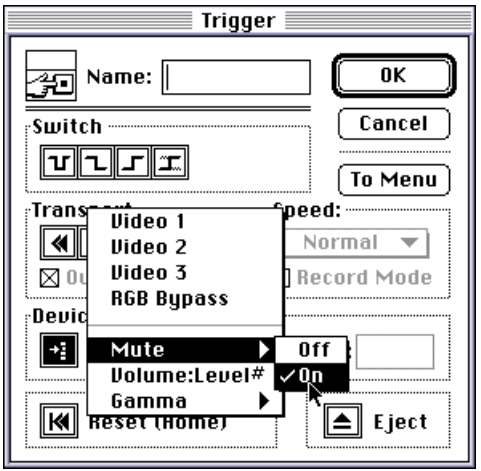
Clicking the question-mark button to the right of the Device pop-up menu shows the origin of the driver (i.e., the name of the file it came from) as well as its version number, which you can set in the Driver Settings dialog box. Don't forget to change the version number if you make any significant changes to the driver in the future, as it allows you to easily determine which version you have on a particular computer or in a SMARTPAX unit.

Click the Status button in the configuration dialog box to display the status window of the device. This window lists all the modes you entered into the driver, as well as their current states. See page 154 for more details on the Serial device.

The value field at the bottom of the status window becomes active if you select a command which requires a numeric value, such as the volume level. Commands that require a numeric value are tagged by a number sign; #.

Using Trigger Cues

To program the device as part of your show, open a timeline window, make sure that your Serial device is still selected in the Device window, and choose a Trigger cue from the Cue menu. Open the cue's dialog box and choose the desired command from the Device Specific Mode pop-up menu.

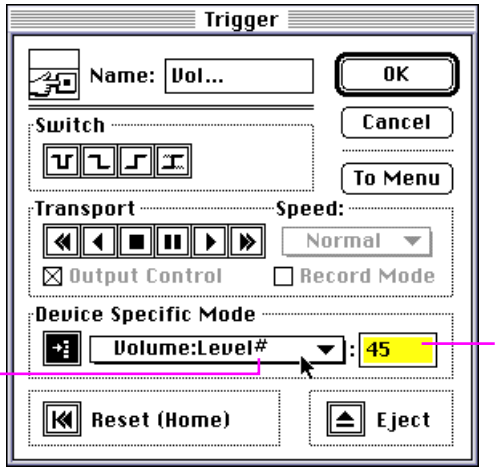


▼ **IMPORTANT:** Remember to select the Serial device before creating a new Trigger cue. If a device is not assigned to the cue, then the Device Specific Mode button will not be available.

Select the Mute:On command, close the dialog box and run the cue by pressing the space bar. Notice how the device's status window is updated to reflect the current state of the Mute mode.

Specifying a Value

To use a command that takes a value, first choose the command on the pop-up menu then type the value in the numeric field to the right.



The number sign indicates that this command requires a value.

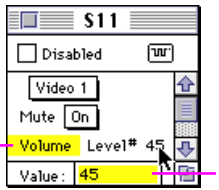
Enter the value here.

The number sign after the command name on the pop-up menu indicates that the command requires a value. The value field to the right of the pop-up menu becomes active when such a command is selected, allowing you to type in the value.

If a command has a value, then the current setting of that value is displayed in the device's status window.

You can change the value in the status window by selecting the command and typing another value into the Value field at the bottom of the status window.

Select the command in the list to activate the Value field.



Change the value and press Return.

- **NOTE:** Such changes made in a status window of a device that is owned by a timeline are only temporary. The status will revert back to the programmed status as soon as you return to the timeline. See "Device Ownership" on page 121 for more details.

11 SMARTPAX

SMARTPAX acts as an interpreter between the standard Dataton language spoken by TRAX and the individual languages spoken by each brand and model of device. The device driver software loaded into SMARTPAX handles the syntax of each device's language. The smartlink cables, connecting SMARTPAX to the devices, handle the physical interface, ensuring that the proper kind of signal reaches the device.

Front Panel

IN Connector

The IN connector links SMARTPAX to TRAX or the previous unit in a chain of multiple control units. Use Dataton SYSTEM CABLE to link units together. This cable is available in 0.4, 1, 2 and 5 meter standard lengths. A system cable kit is available for making custom length cables.

When connected to TRAX, the cable between SMARTPAX and TRAX may be extended up to 100 meters. When connecting to the DATA IN port on a TRANSPAX or AIRLINK RECEIVER, the maximum cable length is 25 meters. This limitation is due to the fact that SMARTPAX, in these cases, will supply power to the connected device.

The TAPE/DATA OK indicator shows when data is being received by SMARTPAX through the IN connector. This is very useful when installing a system as it allows you to follow the signal from one unit to the next, making sure that all units receive data.

OUT Connector

The OUT connector allows you to daisy-chain multiple control units. You can connect units in any order. The maximum cable length between units is 100 meters (see above under “IN Connector” for more details).

The data sent to the next unit through the OUT connector is a high-level, digital signal. The signal is optically isolated and re-shaped in each unit to ensure maximum reliability even in very large systems.

TAPE Connector

The TAPE input accepts a standard Dataton SYNCODE control track, as recorded by the TRANSPAX+ tape interface. This allows you to run a presentation from a control track on an audio tape player rather than from a computer (see "Recording a Control Track" on page 225).

SMARTPAX decodes this tape signal and passes it on to any following units through the OUT connector as a high level digital signal. As the signal that comes from the tape player is a relatively weak line-level signal, the cable between the tape player and the first unit in the chain should be kept as short as possible, preferably no longer than two meters. If longer cable runs are required, you may instead place a TRANSPAX+ close to the tape player and then run a system cable from the OUT connector of the TRANSPAX+ to the IN connector of the first control unit.

For final playback without a computer connected, the control signal from the tape player must be connected to the TAPE input of the first unit in the chain – the control signal will not travel backwards through the system cable. You should never use both the IN and TAPE connectors of a SMARTPAX at the same time – always disconnect the computer while playing a control signal through the TAPE input of a SMARTPAX.

You can monitor the quality of the received control signal by watching the TAPE/DATA OK indicator of the unit to which the tape signal is connected. Although the other units in the chain also have TAPE/DATA OK indicators, only the first unit's indicator will accurately indicate the control signal's quality. The indicator should remain on all the time while playing the tape. Intermittent flickering indicates a poor quality or weak signal. Try adjusting the playback level to correct the problem. If the tape is old, you may have to replace it with a new tape. While the human ear may get used to gradually decreased audio

quality resulting from a worn out tape, the SMARTPAX isn't as adaptable and will eventually fail to read the signal reliably.

These are some specifications of the TAPE input which might be helpful when troubleshooting an installation:

Input sensitivity: 150 mV peak relative ground.

Input impedance: 10 kOhm.

Tape speed tolerance: ±20%.

- **NOTE:** Due to the sparse modulation scheme used by the control signal, it appears as very weak on most regular VU meters or when using an averaging volt meter connected to the tape output. Use an oscilloscope to check the output level, if required.

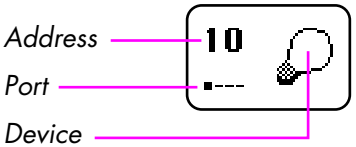
TAPE/DATA OK Indicator

The TAPE/DATA OK indicator is turned on when data is received either through the IN or the TAPE connectors. This is very useful when troubleshooting an installation as it allows you to follow the data signal from unit to unit – ensuring that all units do indeed receive data.

If a control unit receives its data from a tape control track played into the TAPE input of that unit, the TAPE/DATA OK indicator also indicates the quality of the signal. If the indicator flickers frequently, this indicates a poor quality or low signal level (see "TAPE Connector" on page 318).

- **NOTE:** The tape signal quality is only indicated by the first unit in the chain to which the tape player is connected. This is due to the fact that the first unit will remove any bad data received from the tape, so it will not be passed onto the following units.

CONFIGURATION Display



System software version.

Error message.

The configuration display shows the current device driver selection and address assignment for the four ports on the back of the SMARTPAX. See below under ADDR and DEVICE for details on changing the address and device driver.

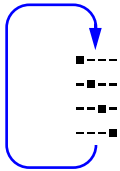
When SMARTPAX is powered up, the display briefly indicates the system software version. This is normally the same as the version of TRAX used to download the device drivers.

If an error occurs, SMARTPAX will flash its display and show an error message.

There are two kinds of error messages: system errors and device driver errors. The "Download failure" message, as shown to the left, is an example of a system error. This particular message means that an error occurred while downloading drivers to SMARTPAX from TRAX. To recover from a download failure, connect the SMARTPAX directly to the computer, open the Device Support window in TRAX, and select "Device Drivers, Manual Mode" on the pop-up menu. Make sure that at least one driver is checked in the list, and click the Download button (see "Downloading in Manual Mode" on page 69). This will restore SMARTPAX to its normal state. Some severe system errors may result in a flashing display but no error message. Even so, performing a manual download usually corrects most such errors.

If the error is related to a specific port, you must select that port using the PORT button in order to see the error message.

PORT Button



Leftmost port selected (front view).

Press the PORT button to cycle through the four ports, as indicated by the four dots in the lower left corner of the display. The same symbols are shown next to each port at the back of the SMARTPAX.

As you change the port selection, the address and device icon in the display change accordingly. Changing the port selection has no effect on the operation of the SMARTPAX.

ADDR Button

The ADDR button changes the address of the currently selected port. This must be set to match the Address field in the Choose Port sub-dialog box of the corresponding device in TRAX (see "Port Assignment" on page 117). Set the addresses of all ports on your SMARTPAX units before downloading the device drivers. This allows TRAX to determine which device drivers should go where, and assign them to the ports accordingly.

The address selection on the SMARTPAX conforms to the same restrictions as the corresponding field in the Choose Port dialog box, i.e., it must be in the range 10 through 77, and neither digit can exceed 7. In addition, you can disable a SMARTPAX port by setting its address to 00.

DEVICE Button

The DEVICE button allows you to change the device driver selection for the currently selected port, choosing from the drivers available in that SMARTPAX. Which drivers are available depends on how they were loaded, as described on the next page.

Selecting a device driver on the SMARTPAX is a three step procedure:

- Select the proper device type by pressing the upper or lower part of the DEVICE button until the correct icon is displayed. The icons at this level correspond to the Device menu in TRAX (page 94).
- Press firmly on the middle of the DEVICE button to move down to the manufacturer level. Then press the upper or lower part of the Device button to choose the device manufacturer.
- Press firmly on the middle of the DEVICE button again and select the model name. Press firmly on the middle again to confirm your selection.

Some drivers may have additional levels. Once you reach the last level, the driver will be activated and its version number will be displayed briefly. The driver version number can also be seen from within TRAX by selecting the driver in the Device Support window and clicking the Info button (see page 65). The version number is found at the bottom of the text field. This method allows you to see if the driver you have in your computer is the same version as the one loaded into a SMARTPAX unit.

◆ **NOTE:** If you make your own device drivers, as described in Chapter 10, remember to increase the version number of the driver if you revise it. This is done in the Serial Device Driver Settings dialog box (page 282). If you forget to do this, you will not be able to tell the difference between an old and a revised driver by their version numbers.

Device Driver Availability

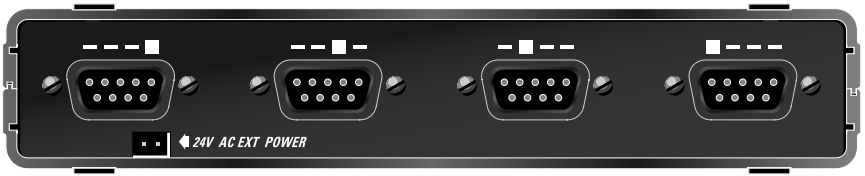
When downloading device drivers using the automatic driver selection method, as described on page 68, TRAX downloads only the required drivers into each SMARTPAX unit.

Alternatively, you may use the manual driver selection method, as described on page 69. In this case, you can specify exactly which drivers that will be downloaded.

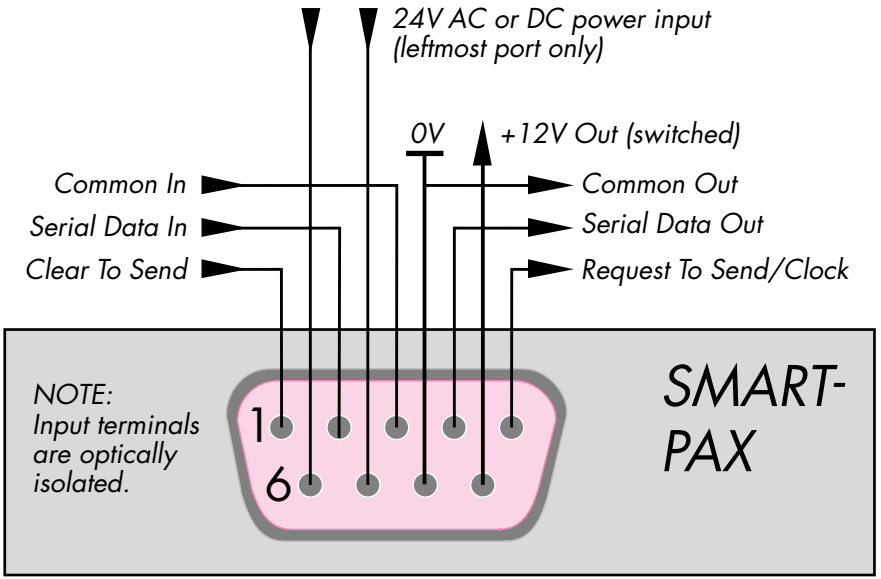
- **NOTE:** SMARTPAX must be connected directly to the computer, with no other units connected after it, in order to use the manual device driver selection method.

After downloading, use the DEVICE button on the SMARTPAX to choose which drivers to actually activate, as described on the previous page.

Rear Panel



The four ports on the back of the unit connect to the devices being controlled, using the appropriate smartlink cable. The symbol above each of the four ports corresponds to the port indicator in the lower left corner of the front panel display.



Wiring of one SMARTPAX port. Power can be supplied to SMARTPAX through the leftmost of the four ports (front view). Most devices are not capable of supplying power to the SMARTPAX, however. Thus, in most cases, a separate power supply is required.

24V AC EXT POWER

AC PAX ADAPTOR (product number 3337) and AC PAX (product number 3338) power supplies.

Connect an ACPAX or ACPAX ADAPTOR here for power supply. Dataton rack adaptors (page 341) have built-in power distribution, allowing you to power up to ten units from a single ACPAX (using an 11 UNIT RACK ADAPTOR), or two units from an ACPAX ADAPTOR (using a 2.5 UNIT RACK ADAPTOR).

▼ **CAUTION:** When disconnecting the 24 V AC cable, always pull the connector, not the wire. The connector is mechanically secured in the receptacle. Pulling on the wire may cause damage or result in bad contact and malfunction later on.

You can supply a SMARTPAX from other power sources as well. SMARTPAX will accept either DC or AC voltage in the range 15 to 24 Volt. Current consumption varies between 0.2 and 1 Ampere, depending on the supply voltage and output loads.

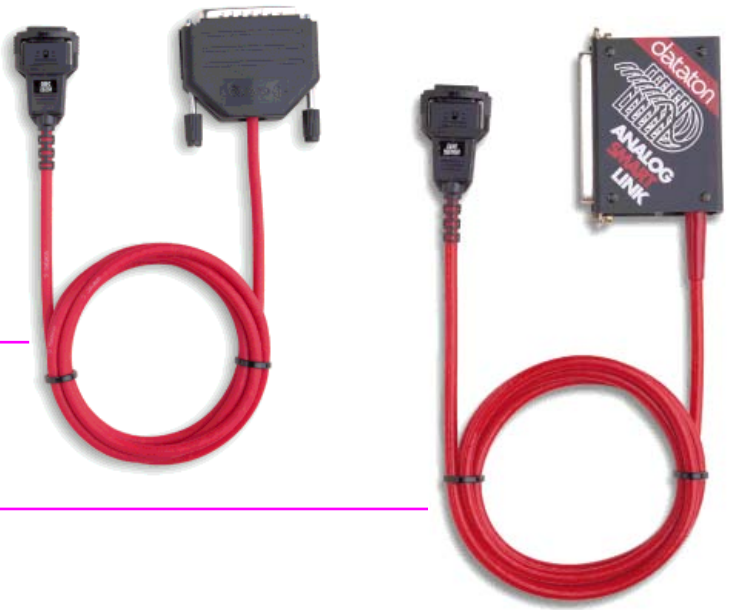
SMARTLINKS

Use a suitable smartlink cable to connect SMARTPAX to the device. A wide variety of smartlinks are available, ranging from simple RS232 cables to sophisticated "active" smartlinks with their own built-in intelligence.

Refer to the Dataton product catalog, or contact your Dataton dealer for the latest news on available smartlinks.

Extensions

You can extend a smartlink by up to 10 meters using EXTENSION CABLE, available in 1, 2, and 5 meter lengths.



RS232 SMARTLINK 3480

ANALOG SMARTLINK 3492

SERIAL SMARTLINKS

Various RS232 and RS422 smartlinks are available for connecting SMARTPAX to devices using these communication standards. In most cases you will be able to tell which smartlink to use by looking up the device in the database built into TRAX (see page 65).

If you're making your own device drivers, using the Serial device driver editor built into TRAX, then see the description of the various RS232 and RS422 smartlinks under "Hardware Interface" on page 272 for wiring information. You can also make your own interface cable using a Dataton AUXILIARY CABLE (product number 3450). This cable has a snap-locking SMARTPAX connector at one end and a "pigtail" in the other, for soldering your own connector (see page 339).

MIDI SMARTLINK

MIDI SMARTLINK (product number 3470) is used to interface SMARTPAX to devices equipped with a MIDI standard port, common on most professional synthesizers and many other audio devices. The MIDI standard is also used on some lighting consoles and related equipment.

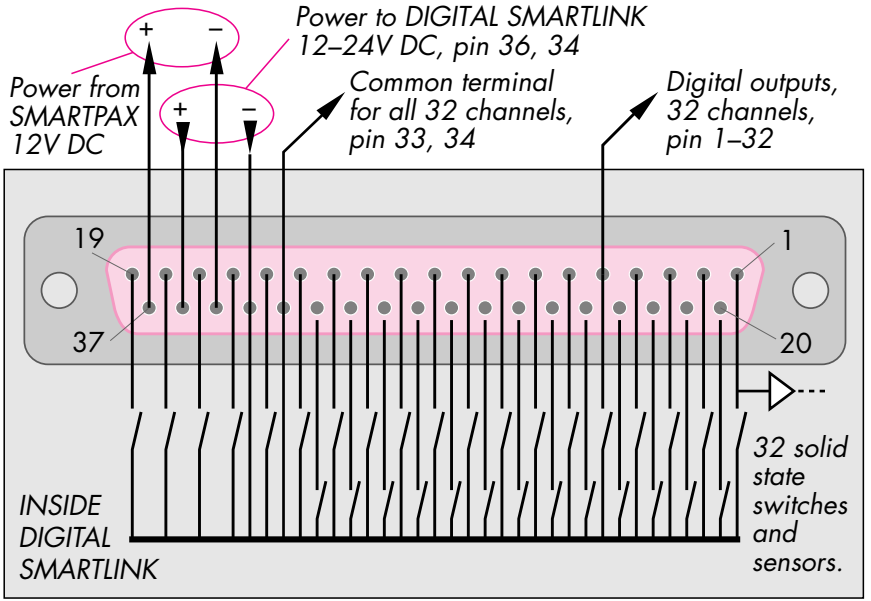
MIDI, unlike most other digital standards, uses separate connectors for data input and output. The male DIN connector on the MIDI SMARTLINK provides the output data, going from SMARTPAX to the MIDI IN port on the device. The female DIN connector is used for data coming from MIDI OUT on the device going to SMARTPAX.

The device information database in TRAX provides additional information on how to configure the device in order to be used with SMARTPAX.

You can create your own specialized MIDI device drivers using the Serial device driver editor built into TRAX, as described in Chapter 10, assuming you have all the details about the protocol of the device to be controlled.

DIGITAL SMARTLINK

DIGITAL SMARTLINK (product number 3491) provides 32 solid state switch outputs/inputs. These outputs/inputs are connected to pin 1 through 32. Pins 33/34 are common for all the outputs/inputs. Each output is capable of switching up to 0.5 Ampere, 50 Volt DC. DIGITAL SMARTLINK has built-in arc suppression, meaning that inductive loads – such as relays and small motors – can be controlled directly, without any additional components.



Whether a pin on the DIGITAL SMARTLINK is used as an input or output is determined by its configuration. It is possible to use a single pin both as an input and as an output, for example to drive a feedback indicator in a button.

Power Supply Considerations

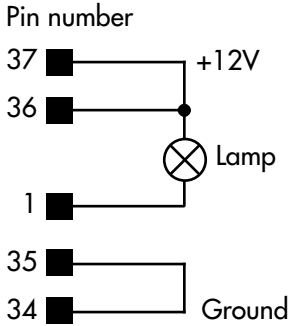
DIGITAL SMARTLINK can be powered by the SMARTPAX by strapping pin 35 to pin 34 and pin 37 to pin 36. In this case, the common pins 33/34 will be connected to ground in the SMARTPAX. You can draw up to 0.5 Ampere from SMARTPAX through pin 37 on the DIGITAL SMARTLINK to power, for example, small relays, LEDs or small lamps controlled by the DIGITAL SMARTLINK.

- **IMPORTANT:** If you have multiple DIGITAL SMARTLINKs connected to the same SMARTPAX, the total load must not exceed 0.5 Ampere. Other smartlinks and devices, such as ANALOG SMARTLINK or TOUCHLINK, may also draw power from the SMARTPAX. Additional power can be supplied to individual smartlinks, if required, using the 12V DC INJECTOR, as shown on page 345.

Alternatively, you can power the DIGITAL SMARTLINK from outside. To do so, connect the power supply (+12 to 24 V DC) to pin 36 and the power supply ground to pin 34. Furthermore, if the DIGITAL SMARTLINK is connected to the leftmost port (front view) of the SMARTPAX, it will supply power to the SMARTPAX as well. The current consumption will vary between 0.2 and 1 Ampere, depending on the voltage and the load. 24 V DC is recommended for reliable operation under heavy load conditions.

- **WARNING:** Do not strap pin 35-34 and 37-36 when powering the DIGITAL SMARTLINK from the outside through pin 36.

Digital Output Functions

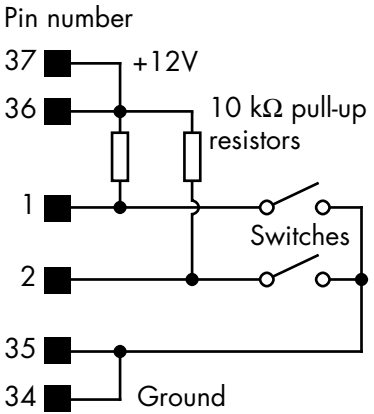


To drive a lamp or a relay from a DIGITAL SMARTLINK, connect it between the desired output pin (pin 1 in the example to the left) and the positive pin of the power supply (i.e., pin 37 if you draw power from SMARTPAX, else the positive output from your external power supply).

When the output is activated, the DIGITAL SMARTLINK pin will be pulled to ground, causing the lamp or relay coil to be turned on.

When driving several lamps or relays in this way, you must add the current consumption (mA) of all the loads to determine the power requirement. You can not draw more than 0.5 A (i.e., 500 mA) from a single SMARTPAX (see "Power Supply Considerations" on page 329). If your total load exceeds this limit, you must use a separate power supply to supply the current to your load and the DIGITAL SMARTLINK. See the illustration under "Combined Input/ Output Functions" on page 332 for an example of how this can be done.

Digital Input Functions



To use a DIGITAL SMARTLINK for input functions, such as push-buttons or relay closures, connect the buttons/relay switches as shown in the illustration to the left. Note that the switches close to ground. The DIGITAL SMARTLINK considers an input as activated when the input pin (pin 1 and 2 in the example to the left) is grounded.

Conversely, to make the DIGITAL SMARTLINK detect when the input switch is no longer pressed, a pull-up resistor is needed to pull the input pin away from ground. You must connect a separate pull-up resistor to each input pin, as shown to the left. A 10 kOhm pull-up resistor is recommended if the pin is used only for input functions. When using the same pin both as an input and output, the output load can usually double as the pull-up as well, as shown in the example under "Combined Input/Output Functions" on page 332.

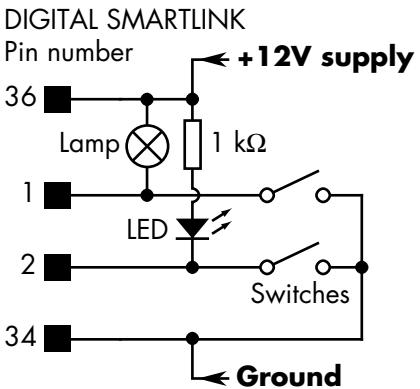
If you are driving a DIGITAL SMARTLINK input from an active source – i.e. a source that can actively output 0 and +12 volt – a pull-up resistor is not required

Combined Input/Output Functions

By selecting "Both" in the configuration dialog box for the switch (page 130), you can make the same pin act both as an input and an output. This can be used, for example, to control a lamp or LED built into the button used to activate a function.

▼ **IMPORTANT:** When the same pin is used for both the input and output functions, it is not possible to detect if the input is activated while the output is on.

See "Input Switches and User Feedback" on page 242 for more details.



◆ **NOTE:** The output load (i.e., the lamp or resistor/LED) in the example above, also doubles as a pull-up for the input function.

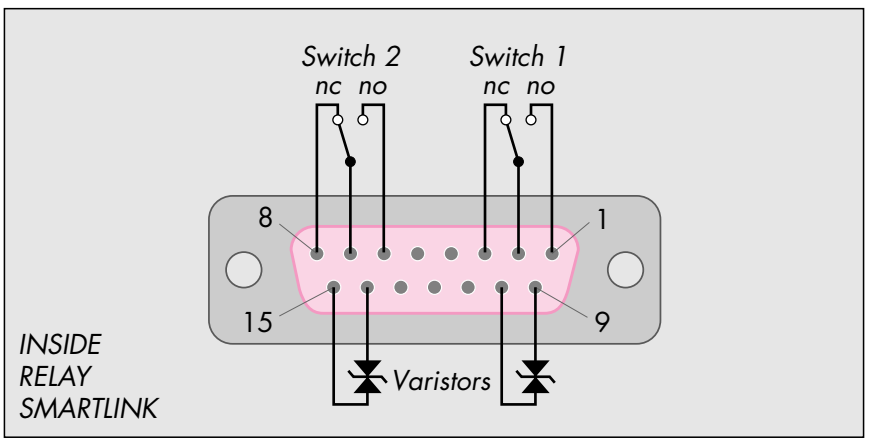
RELAY SMARTLINK

RELAY SMARTLINK (product number 3494) provides two independent single pole, double throw electromechanical relays. The relays are housed inside a 15 pin female D-sub connector. Two LEDs indicate the status of the relays.

Each relay is capable of switching up to 2 Ampere, 24 Volt DC or AC. For each relay, both the "normally closed" and "normally open" terminals are accessible. The drawing below show both relays in their passive states (i.e., normally closed).

In addition to the two relays, there are also two built-in arc suppression varistors, intended to be wired across the relay switch when switching inductive loads such as motors or other relays.

Use two Switch devices to program the relays (page 129). See the device information database entry for "Dataton:Digital Smartlink" for more details.

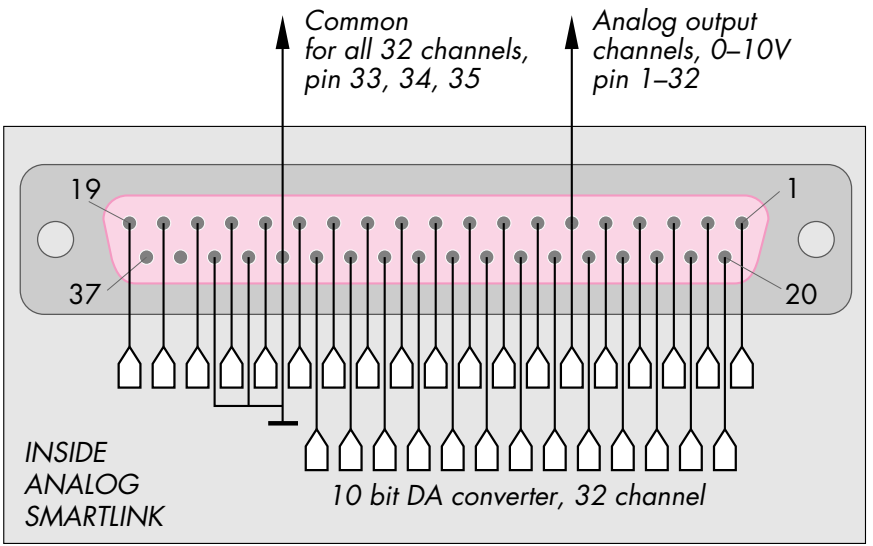


ANALOG SMARTLINK

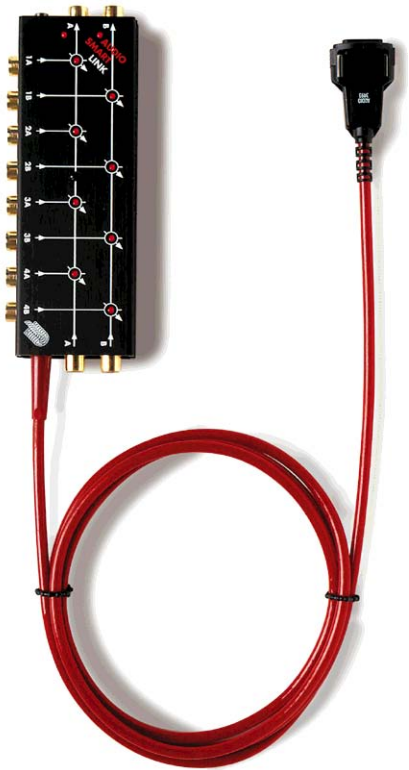
ANALOG SMARTLINK (product number 3492) provides 32 independent 0–10 V DC analog output channels (pin 1 through 32). Pins 33/34/35 are common for all the output channels. Each output channel is capable of sinking and sourcing up to 10 mA. However, to achieve the highest accuracy on the output voltage, the load impedance should not be lower than 20 kOhm.

The output precision is based on a 12 bit D/A converter, resulting in up to 4096 discrete steps. TRAX takes full advantage of this high precision by allowing you to use fractional percentage values in the Set/Fade cue.

Use Level or Lamp devices to program the outputs (page 149). See the device information database for more details.



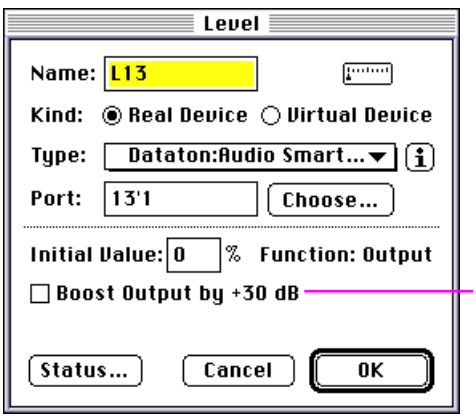
AUDIO SMARTLINK



AUDIO SMARTLINK (product number 3493) is an eight input/two output audio mixer (four stereo pairs). Two additional, fixed inputs allow multiple units to be cascaded for increased input capacity. LEDs indicate overloading resulting in distortion of the audio signal. Max input level is +10 dBU (unbalanced, 10 kΩ input impedance). The unbalanced outputs can drive 600 Ω.

Use Level devices to program the AUDIO SMARTLINK channels (page 149). There are two device drivers available for controlling AUDIO SMARTLINK; one treats the eight inputs as eight independent levels while the other one treats them as four volume and four balance levels (see the device information database entry for each device driver for more details).

A checkbox in the device's configuration dialog box allows you to determine whether the 100% level should correspond to 0 dB (no gain) or +30 dB (the input signal is boosted by 30 dB when at 100% level).



Select this checkbox to amplify a weak audio signal by 30 dB.

DMX SMARTLINK

The DMX SMARTLINK (product number 3485) provides control of up to 32 DMX-512 lighting channels. The DMX-512 control protocol is supported by most dimmer manufacturers, particularly in staging and theater environments.

Use up to 32 Lamp or Level devices to program the DMX-512 channels (page 149). You can mix Lamp and Level devices, allowing you to, for example, use a Lamp device to control the brightness and Level devices for the positioning of a movable light.

Please refer to the device information database for further details on how to connect and configure specific dimmers and lights. As the DMX-512 protocol is standardized, you can most likely use the DMX SMARTLINK to control devices even if they are not listed in the Device Support window. If so, please refer to the manufacturer's documentation on how to connect and configure the device.

PMX SMARTLINK

The PMX SMARTLINK (product number 3456) provides control of up to 32 PMX lighting channels. The PMX control protocol is supported by most dimmers and lights manufactured by Clay Paky (Pedrengo, Italy) and Pulsar (Cambridge, U.K.).

Use up to 32 Lamp or Level devices to program the channels (page 149). You can mix Lamp and Level devices, allowing you to for example use a Lamp device to control brightness and Level devices for positioning.

Please refer to the device database for further details on how to connect and configure specific dimmers and lights.

TAPE SMARTLINK

The TAPE SMARTLINK (product number 3458) provides a programmable timecode output, according to the SMPTE and EBU LTC timecode standards. This can be used to control any device capable of synchronizing to external timecode – a feature often referred to as "chase lock".

In addition to programming the timecode stream, you can also program the user bits, which are part of those timecode standards. These user bits are sometimes used to provide additional control over the device.

Use a Tape device to program the TAPE SMARTLINK (page 133), choosing the "Timecode:SMPTE" device driver. You may need to use Trigger cues to configure the parameters of the device driver according to the device. Please refer to the device information database for more details.

MAC SMARTLINK

The MAC SMARTLINK (product number 3457) provides control of most presentation graphics software running on Apple Macintosh computers and compatibles. It connects through the ADB port, and works by emulating the keyboard to control the presentation program.

Use a Still Store device in TRAX to control the Macintosh (page 147). Choose your presentation software on the Type pop-up menu in the device's configuration dialog box. Please refer to the device information database for more details.

- **NOTE:** PC and Windows based presentation software can be controlled in the same way, using a PC SMARTLINK (product number 3487).

IR SMARTLINK

The IR SMARTLINK (product number 3453) can control most devices equipped with an infrared remote control by emulating the functions of the remote. It is used by some Audio Disc, Video Disc and Tape devices, as well as generic IR devices (including video projectors). Please refer to the device information database for each device for more details.

In addition to the IR drivers built into TRAX itself, TRAX also comes with additional IR driver libraries. These libraries provide basic support for many domestic AV devices. To activate these libraries, move them to the same folder as the TRAX application and re-start TRAX.

Specialized IR device drivers can be supplied. Please contact your Dataton dealer for further information.

SYSTEM IN/OUT SMARTLINK

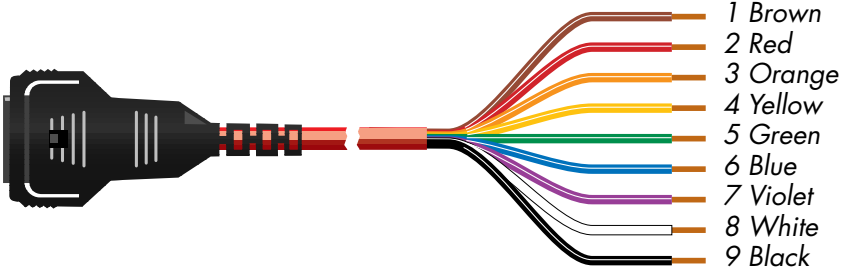
Use SYSTEM IN SMARTLINK (product number 3477) and SYSTEM OUT SMARTLINK (product number 3478) to connect a Dataton product to a SMARTPAX port. For example, you need a SYSTEM OUT SMARTLINK to connect TRANSPAX+ and/or PAX to a TRAX system when used in the Interactive system mode (see "System Modes" on page 16). Likewise, a SYSTEM IN SMARTLINK is required to connect a MICTOUCH to a SMARTPAX for use with TRAX.

Other Smartlinks

Other smartlinks may be available for specialized purposes and new smartlinks are under constant development. Please contact your Dataton dealer for the latest news on available smartlinks and supported devices.

Specialized cables can be made using an AUXILIARY CABLE, which provides the snap-locking plug at the SMARTPAX end, and a "pigtail" at the other end. Here you can attach the connector required for the device at hand. This assumes that a standard hardware interface, such as RS232 or similar, is being used. Device drivers for such devices can be made using the Serial device driver editor built into TRAX (see Chapter 10).

Use AUXILIARY CABLE (product number 3450) for making specialized interface cables.



◆ **NOTE:** The wiring diagram for a SMARTPAX port is shown on page 324.

Power Supply

AC PAX ADAPTOR (product number 3337) and AC PAX (product number 3338) power supplies.

There are three possibilities for supplying power to the SMARTPAX.

- Through the 24 V AC EXT POWER connector at the back.
- Through the leftmost device port (front view) using selected smartlinks and devices.
- Through the DATA OUT connector on the front panel from the next SMART-PAX in the chain.

The 24 V AC EXT POWER is the primary way to supply power to the SMARTPAX. Use this method unless the documentation for the device or smart-link tells you otherwise. Normally you would connect an ACPAX ADAPTOR or an ACPAX here, either directly or through the power distribution feature built into Dataton rack adaptors. Other power sources can also be used, if desired (see "24V AC EXT POWER" on page 325).

Currently, only the DIGITAL SMARTLINK and the SIMDA slide projectors are able to supply power to the SMARTPAX through the leftmost device port. The DIGITAL SMARTLINK then has to be connected to an external power supply, as described under "Power Supply Considerations" on page 329.

◆ **NOTE:** Only the leftmost port (front view) can be used for powering the SMARTPAX in this way.

The ability to take power through the DATA OUT port is provided as a safety feature only. If the power supply for the SMARTPAX fails, it may be able to get enough power from the next unit further down the chain to keep working until the problem has been resolved. This supply may not be sufficient under heavy load conditions, and is not recommended for normal use.

Rack Adaptors

Rack adaptors are available with capacities ranging from two to ten units with room for power supply and integrated power distribution. The illustration below shows the 11 UNIT RACK ADPATOR (product number 3505).

12 TOUCHLINK

TOUCHLINK is a color LCD touch panel that can provide an attractive user interface for your TRAX-based system. It connects to a port on a SMARTPAX. You can use any number of TOUCHLINK units in a system.

Specifications

- 320 x 240 pixel backlit, color LCD display.
- High-resolution touch surface.
- 2 MB non-volatile FLASH memory.
- 0.5 MB RAM memory.
- Up to 99 pages of buttons, sliders, indicators, etc.
- Custom graphics.
- Two fonts, three sizes, two weights.
- Motion sensor controlling the display backlighting plus programmable function.
- Three programmable mechanical push-buttons on the side.
- Loudspeaker with 11 kHz, 8 bit sampled audio.
- Power requirements: 12 V DC, 500 mA maximum.
- Rugged, solid aluminum housing.
- 2 meter black cable that connecting TOUCHLINK to SMARTPAX. This can be extended if required by up to 30 meters (see "Power Supply" on page 344).

◆ **NOTE:** The contrast of the LCD screen can be adjusted by keeping the small side button pressed while pressing the top or bottom part of the large side button. This works regardless of any programmed functions of these buttons.

Design and Programming

TRAX provides all that is needed to design the appearance and functionality of TOUCHLINK, as well as to download this to the device. All user input is sent back to TRAX, which then carries out the various functions as programmed. This provides control over the devices in the system as well as feedback to TOUCHLINK.

Please refer to Chapter 6 for full details on how to design and program your TOUCHLINK application.

Mounting Accessories

TOUCHLINK comes with a clear plastic tilt-stand. This stand raises the back of the unit, making it more suitable for desktop use. It can be easily detached for handheld operation.

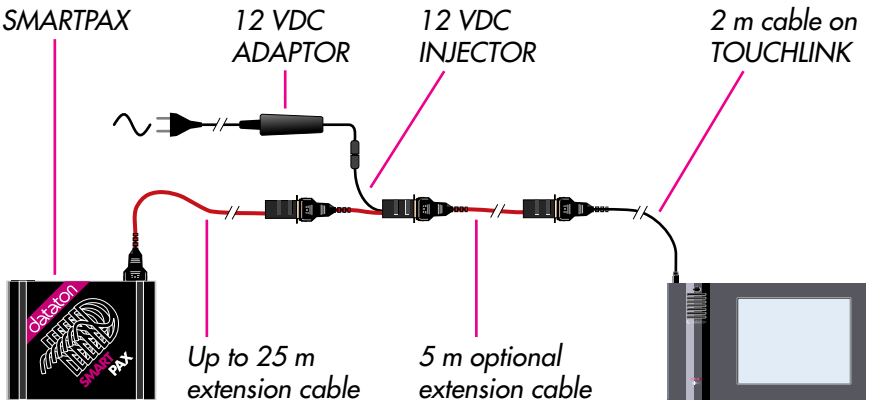
Alternatively, TOUCHLINK can be mounted on a wall using the optional TOUCHLINK WALL KIT (product number 3551). This fastens the unit securely, and it can only be removed using the included tool. Furthermore, it hides the connector and cable, making it impossible to unplug the unit.

Power Supply

TOUCHLINK normally takes its power from the SMARTPAX to which it is connected. However, under some conditions this is not possible, such as:

- When the cable between the SMARTPAX and the TOUCHLINK needs to be extended by more than 5 meters.
- When there are more than one TOUCHLINK connected to the same SMARTPAX.
- When there are other devices connected to the same SMARTPAX which also may draw power from SMARTPAX (such as DIGITAL SMARTLINK, as shown in the example on page 330).

In these cases, power should be supplied to TOUCHLINK separately using a 12V DC INJECTOR (product number 3419) and a 12V DC ADAPTOR (product number 3334). The DC INJECTOR connects between SMARTPAX and TOUCHLINK, close to TOUCHLINK. You may extend the TOUCHLINK cable by up to 5 meters on the TOUCHLINK side of the DC INJECTOR. The cable between the DC INJECTOR and the SMARTPAX can then be up to 25 meters.



Supplying power separately to a TOUCHLINK using 12 VDC INJECTOR.

13 AIRLINK

AIRLINK is a wireless remote control system. It can be used for many different applications, ranging from controlling a few slide projectors to large-scale multimedia systems and interactive applications.

- Use it for speaker support applications by connecting it directly to the computer running TRAX.
- Use it for interactive applications by connecting it to a SMARTPAX port.
- Use it with PAX or SMARTPAX for direct control of up to four slide projectors, with full dissolve and random access capabilities.

Transmitter

The AIRLINK TRANSMITTER (product number 3448) has 13 keys. Individual keys can be labelled according to their function, or removed to simplify the layout. The enclosed AIRLINK OVERLAY KIT provides labels for customizing the transmitter with numbers, texts and symbols for most applications.

A special outsize key, that is easy to find even in total darkness, is normally used for the most basic function of the application, such as START, NEXT or ON/OFF.

The transmitter uses proprietary power pulse modulation technology to provide unmatched operational range while using very little power. The built-in high-energy lithium cells will last for ten years under normal conditions.

Speaker Support Applications

To control a TRAX timeline using an AIRLINK TRANSMITTER, first connect the receiver to the computer, as described under "Connecting to the Computer for Speaker Support" on page 351. Then press the large key on the transmitter to run the timeline to the next cue on the current track. This utilizes the current track as a *stop track*, as described under "Timing of Events" on page 226.

▼ **IMPORTANT:** The timeline window must be the active window in order to be controlled by AIRLINK.

The four buttons at the top (the large key plus the three below) mimic the arrow keys on the computer's keyboard. Thus you can use the up arrow or the left arrow key to rewind the timeline to the previous cue on the stop track. Use the right-hand arrow key to skip ahead to the next cue. The down arrow key runs in real time to the next cue. Use the "Current Track Locked" check box in the Timeline Specifications dialog box (page 105) to prevent the current track selection from being changed accidentally while you are using it as a stop track.

The remaining nine buttons on the transmitter mimic function keys F5 through F13 on the computer's keyboard. They can be used to jump directly to any position on the timeline using the QuickFind feature by simply entering the corresponding name into a Control cue. Whenever you press the corresponding key on the keyboard or the AIRLINK TRANSMITTER, the show will instantly jump to that position. See "Using QuickFind" on page 88 for more details.

Fully Interactive Applications

Numbering of AIRLINK buttons when connected through a SMARTPAX port.

Connecting the AIRLINK directly to the computer, as described on the previous page, provides convenient and direct control over the active timeline window without any additional programming. However, for fully interactive applications, this kind of fixed functionality may be too limited.

For increased flexibility, you can connect AIRLINK RECEIVER through a SMARTPAX port, as described under "Connecting through SMARTPAX for Interactive Applications" on page 353. Add a Switch device to the Device window corresponding to each button on the AIRLINK, and program the behavior of the buttons through the Task window. You program the AIRLINK buttons in the same way you would program other inputs to the system. See "Inputs" on page 242 for more details.

- **NOTE:** In addition to providing more flexibility, this way of connecting the receiver also allows you to connect more than one AIRLINK to the system, for example for use in different rooms. Furthermore, the receivers can be located farther away from the computer, as they are connected through SMARTPAX units, which can be distributed throughout the building, rather than directly to the computer.

Slide Projector Control

You can use AIRLINK to directly control one, two, three or four slide projectors, without using any computer at all. Using the numeric keys on the AIRLINK, you can directly locate any slide by number. When used with two or more projectors, AIRLINK will make smooth dissolves between projectors, both forwards and backwards.

Label the buttons on the AIRLINK TRANSMITTER as shown to the left. If you don't want slide number random access, the related keys can be removed and covered with the blank labels. This safeguards against pressing the wrong key and sending the projectors to another slide. If you're not using fast random access projectors, this could take quite a while, and can be very annoying in the middle of a presentation.

Press the NEXT key to advance to the next slide. If you're using two or more projectors, this will be done by a one second dissolve. If you're using only one projector, it will simply advance the tray. Press the minus key to go back one slide.

Use the numeric keys to go to a slide by number. This works with all slide projectors, but is particularly useful with fast random access slide projectors such as the Simda and Kodak Ektapro models. First enter the desired slide number using the numeric keys, then press NEXT to go there. Press CLEAR to cancel the numeric entry if you make a mistake.

- **HINT:** This numeric access feature can be used to home the slide projectors by pressing 0 and NEXT. When returned to the zero position, the lamps will go off as well.

In order to make dissolves, AIRLINK uses all available slide projectors sequentially. Thus, if you have two slide projectors, the first slide will be in tray position one in the first projector, the second slide is in position one in the second projector, the third is in position two in the first projector, and so on. This must be taken into account when loading the trays, and when entering the slide number using the numeric keys. Thus, the number entered corresponds to the slide's sequential position in the show – not the number of its slot in the tray (unless you use only a single projector, of course). It also means that it isn't easy to add another projector to the show when you run out of tray slots. If you must add a projector, then you must also shuffle all slides around to match the new sequencing order.

Receiver

The AIRLINK RECEIVER (product number 3449) can be connected to SMARTPAX, PAX or the ADB port on the TRAX computer. Its application varies according to how it is connected, as described below.

The receiver is very sensitive, providing maximum operational range and reliability. Avoid placing it close to incandescent lamps or in direct sunlight.

The standard two meter cable on the AIRLINK RECEIVER can be extended, if required, using Dataton system cable:

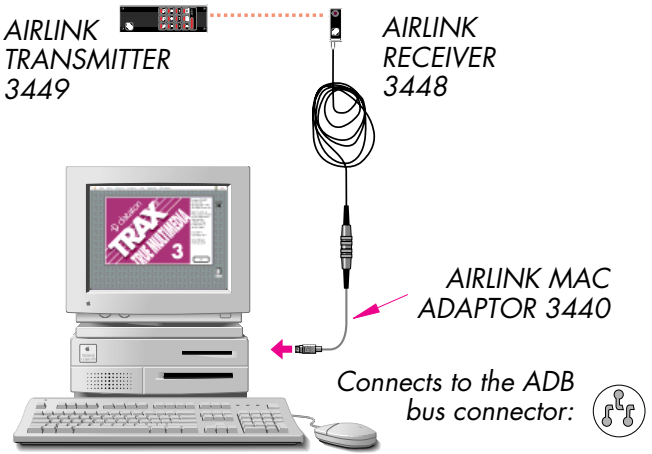
- When connected to the ADB port on a Mac: five meters maximum using SYSTEM CABLE 3415. As Apple doesn't recommend extending the ADB bus, try to avoid this where possible by moving the computer instead.
- All other cases: twenty-five meters maximum using five SYSTEM CABLE 3415 or a custom-made cable using SYSTEM CABLE KIT 3420.

Connecting to the Computer for Speaker Support

For basic speaker support functions, connect the AIRLINK RECEIVER to the ADB (i.e., keyboard) port on the back of the TRAX computer. You can connect the receiver either directly to the ADB connector on the back of the computer or to the loop-through connector on the keyboard. Some computer models have only one ADB port, leaving no port available for the AIRLINK RECEIVER if you want the mouse connected at the same time. In this case, use an ADB expansion box or Y-cord to connect the receiver. Although the PowerBook models only have one ADB port, they don't have this problem as both the keyboard and the trackball/trackpad are connected internally.

▼ **IMPORTANT:** Always connect the AIRLINK RECEIVER to the ADB port before turning on the computer. Connecting the receiver while the power is on may cause serious damage to your computer.

AIRLINK is specifically designed to work with TRAX, but it can also be used with other applications that use a similar set of keystrokes to perform the desired functions. Using a macro program, such as CE Software's QuicKeys, you can further customize the behavior of the keys making, for example, the function keys switch between different applications.



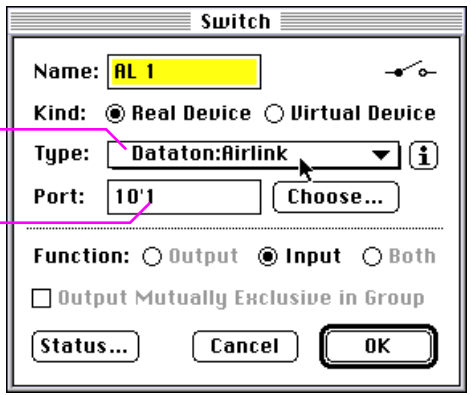
Please refer to "Speaker Support Applications" on page 347 for details on how to use AIRLINK in this configuration.

Connecting through SMARTPAX for Interactive Applications

For fully interactive applications, connect AIRLINK RECEIVER to a port on a SMARTPAX using the enclosed SYSTEM IN SMARTLINK cable. Add a number of Switch devices to the Device window in TRAX, corresponding to the number of AIRLINK buttons you intend to use. Choose "Dataton:Airlink" on the Type pop-up menu inside those switch devices. Download the device driver to SMARTPAX to activate the receiver.

Select "Dataton:Airlink".

Enter the key number, as shown in the picture on page 348, as the sub-address.



◆ **NOTE:** You must select the Interactive system mode (page 112) in order to use AIRLINK in this way.

See "Fully Interactive Applications" on page 348 for more details.

▼ **IMPORTANT:** Don't confuse connecting the AIRLINK RECEIVER to a port on the back of a SMARTPAX with connecting it to the DATA IN connector on the front, as described on the next page. In order to use it with TRAX for fully interactive applications, you must connect the receiver to the back of the SMARTPAX and use the appropriate device driver.

Connecting to PAX or SMARTPAX for Slide Control

Connect AIRLINK RECEIVER to the IN port on a PAX or SMARTPAX for direct control of up to four slide projectors (see "Slide Projector Control" on page 349).

If you're using PAX, then set its BANK selector at 1L, and its OBJECT selector according to the type of projector being used (see Chapter 14). Connect the projectors using the relevant projector adaptor cables, starting with the leftmost port (front view).

If you're using a SMARTPAX, then select the appropriate device driver and address, beginning with address 10 for the first projector (see Chapter 11 for details). Connect the projectors with the relevant smartlink cables starting with the leftmost port (front view).

▼ **IMPORTANT:** When turning on the system, you must make sure that all projectors are turned on before or at the same time as the power to the PAX or SMARTPAX.

If the control unit is powered from the projectors, this is normally not a problem. The easiest way to do it is by turning on all projectors using a common power switch. If you turn on the projectors one by one, you must turn on the projector connected to the leftmost port (front view) last, as this projector supplies power to the PAX/SMARTPAX.

If you supply power to the control unit through its 24 VAC EXT POWER socket on the back, then turn on all the projectors before or at the same time as you turn on the power to the control unit. If the control unit is powered before all the projectors have been turned on, AIRLINK may not recognize the projectors.

14 PAX

PAX is a dedicated slide projector control unit. It handles up to four electro-mechanical slide projectors, and can be adapted to most kinds of projectors equipped with a dissolve unit connector, which use straight or rotary slide trays.

- **NOTE:** Use SMARTPAX for controlling slide projectors equipped with an RS232 control port.

When used with a TRANSPAX+, PAX can play back shows originally created on other multi-image systems, including Arion and Kodak PDC (MATE TRAC), AVL (Procall-5 and Procall-X) and Electrosonic (Alphasync). See Chapter 15 for details.

PAX can also be used to control up to eight switch functions, providing two relays on each of the four ports. A port can be used for either two relay functions or a slide projector, but not both at the same time.

Front Panel

IN Connector

The IN connector links PAX to TRAX or the previous unit in a chain of multiple control units. Use Dataton system cable to link units together. This cable is available in 0.4, 1, 2 and 5 meter standard lengths. A system cable kit is available for making custom length cables.

▼ **IMPORTANT:** When connecting PAX to a primary system cable bus, TRAX must be set to its backward compatible mode. If you are using the interactive system mode, PAX must be on a secondary bus, connected through a SMARTPAX port. This port must use one of the TRANSPAX+ or open-reel related device drivers. See “System Modes” on page 16 and “Connecting TRANSPAX+” on page 369 for more details.

When connected to TRAX, the cable between PAX and TRAX may be extended up to 100 meters. When connecting PAX to a TRANSPAX+ or AIRLINK RECEIVER, the maximum cable length is 25 meters. This limitation is due to the fact that PAX, in these cases, will supply power to the connected device.

The TAPE/DATA OK indicator shows when data is being received by PAX through the IN connector. This is very useful when installing a system as it allows you to follow the signal from one unit to the next, making sure that all units receive data.

OUT/RMT IN Connector

The OUT connector allows you to daisy chain multiple control units. You can connect units in any order. The maximum cable length between units is 100 meters (see "IN Connector" on page 356).

The data sent to the next unit through the OUT connector is a high-level digital signal. The signal is optically isolated and re-shaped in each unit to ensure maximum reliability even in very large systems.

Alternatively, this connector can be used with a Kodak S-AV wired remote control or compatible. This provides basic dissolve functions using two, three or four projectors, and is suitable for simple speaker support presentations using slide projectors only. The forward and reverse buttons on the remote control will dissolve sequentially to the next or previous slide. The focus button on the remote control provides a slow dissolve, which can be stopped at any point by releasing the button. This allows you to superimpose one image on another.

TAPE Connector

The TAPE input accepts a standard Dataton control signal, as recorded by the TRANSPAX+ tape interface (see "Recording a Control Track" on page 225). This allows you to run a presentation from a control track on an audio tape player rather than from a computer.

PAX decodes the control track signal and passes it on to any following units through the OUT connector as a high-level digital signal. As the signal that comes from the tape player is a relatively weak line-level signal, the cable between the tape player and the first unit in the chain should be kept as short as possible, preferably no longer than two meters. If longer cable runs are required, you may instead place a TRANSPAX+ close to the tape player and then run a system cable from the OUT connector of the TRANSPAX+ to the IN connector of the first control unit.

For final playback without a computer connected, the control signal from the tape player must be connected to the TAPE input of the first unit in the chain – the control signal will not travel backwards through the system cable. You should never use both the IN and TAPE connectors of a PAX at the same time – always disconnect the computer before playing a control signal through the TAPE input of a PAX.

You can monitor the quality of the received signal by watching the TAPE/DATA OK indicator of the unit to which the tape signal is connected. Although the other units in the chain also have TAPE/DATA OK indicators, only the first unit's indicator will accurately indicate the control signal's quality. The indicator should remain on all the time while playing the tape. Intermittent flickering indicates a poor quality or weak control signal. Try adjusting the playback level to correct the problem. If the tape is old, you may have to replace it with a new tape as the PAX will eventually be unable to read the signal reliably.

The following specifications of the TAPE input may be helpful when troubleshooting an installation:

Input sensitivity: 150 mV peak relative ground.

Input impedance: 10 kOhm

Tape speed tolerance: ±15%

- **NOTE:** Due to the sparse modulation scheme used by the control signal, it appears as very weak on most regular VU meters or when using an averaging volt meter connected to the tape output. Use an oscilloscope to check the output level, if required.

TAPE/DATA OK Indicator

The TAPE/DATA OK indicator will be turned on when data is received either through the IN or the TAPE connectors. This is very useful when troubleshooting an installation as it allows you to follow the data signal from unit to unit, ensuring that all units indeed receive data.

If the unit receives its data from a control signal played into the TAPE input of that unit, the TAPE/DATA OK indicator also indicates the quality of the signal. If the indicator flickers frequently, this indicates a poor quality or low-level control signal.

- **NOTE:** The tape signal quality is only indicated by the first unit in the chain to which the tape player is connected. This is because the first unit will remove any bad data received from the tape, so it will never be received by the following units.

OBJECT Selector

Use the OBJECT selector to adapt PAX to the kind of projector or relay functions being controlled. You will need a small, flat screwdriver to turn the selector. Select the corresponding projector model on the Type pop-up menu in the projector's configuration dialog box (see page 123).

SAV. All Kodak Carousel S-AV models.

SAV NH. All Kodak Carousel S-AV models when electronic home sensing is not desired (NH = No Home).

EKTA III. All Kodak Ektagraphic III models.

EKTA III NH. All Kodak Ektagraphic III models when electronic home sensing is not desired (NH = No Home).

EKTA II. This position isn't used.

LIN 1. All linear tray projectors equipped with 150 Watt halogen lamps.

LIN 2. All linear tray projectors with 250 Watt halogen lamps.

RA. Random Access projectors with rotary slide trays.

E AUX. For controlling switch relay functions only. Use this setting when no projectors are connected to the PAX.

There is an additional, unmarked, position just above the E AUX position for use with the Hasselblad PCP80 slide projector.

- **NOTE:** When used with the Hasselblad PCP80 projector, it is recommended that you use a separate ACPAX ADAPTOR to supply power to the PAX. If not, you may have to press the LAMP buttons on the projectors to activate them.

The "No Home" positions for the S-AV and Ektagraphic III modes defeats the electronic home sensing built into these projector models. This can be useful when running older shows made on other multi-image systems which do not support this feature.

Any port not used for controlling a slide projector can be used for two relay functions. This applies to all OBJECT settings except LIN 1 and LIN 2. PAX will automatically sense whether a projector is connected to the port or not. Use the E AUX position of the OBJECT selector if the PAX is being used for relay functions only. See "Switch Functions" on page 367 for more details on how to use a PAX port for relay functions.

BANK Selector

BANK selector at 2H, using projectors only.

BANK selector at 2L, using relay functions only.

Use the BANK selector to set the address range used by the PAX unit. The setting of this switch corresponds to the entry in the Port field in the devices' configuration dialog boxes:

BANK	Addresses
1L	10 – 13
1H	14 – 17
2L	20 – 23
2H	24 – 27
3L	30 – 33
3H	34 – 37
4L	40 – 43

BANK	*Addresses*
4H	44 – 47
5L	50 – 53
5H	54 – 57
6L	60 – 63
6H	64 – 67
7L	70 – 73
7H	74 – 77

When used with projectors, addresses are assigned from left to right, front view. Thus, the address of a projector connected to the leftmost port of a PAX set to 2H is 24.

When used with relay functions, addresses are assigned from right to left, front view. This is the opposite of the projector address assignment.

For a PAX set to 1L with projectors on the first two ports and relay functions on the other two, the addresses are assigned like this: 10, 11, 11, 10.

The last settings, 8L and 8H, are not used with TRAX. Setting the BANK selector to any of these settings effectively disables that PAX unit, and it will not respond to any commands from TRAX.

LINE-UP Button

Press the LINE-UP button to turn the projector lamps on and off in order to align the images on the projection screen. PAX will sequence the projectors automatically as you press the LINE-UP button. One of the projectors is left on throughout the line-up sequence, allowing it to be used as a reference for the others. Using special alignment slides is highly recommended.

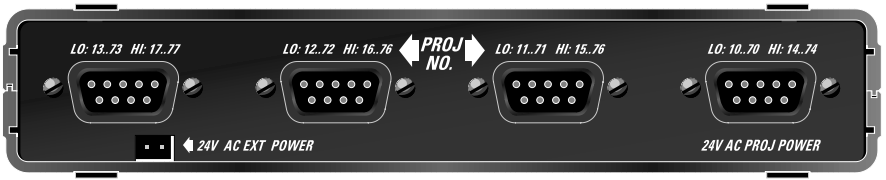
- **NOTE:** If PAX receives any instruction through the TAPE on IN connector during the line-up which causes a slide tray to move, then the line-up sequence will be aborted and all lamps set to their programmed levels.

Manual Reset

Press the LINE-UP button firmly for about two seconds to force all projectors to turn off their lamps and return the slide trays to their home positions. This allows you to manually reset all projectors, for example at the end of a speaker support presentation using a remote control connected to OUT/RMT IN.

- **NOTE:** Manual reset can't be used while PAX receives data through the IN or TAPE connectors, as this data will immediately restore the projectors to their programmed states. Use a Trigger:Reset cue instead.

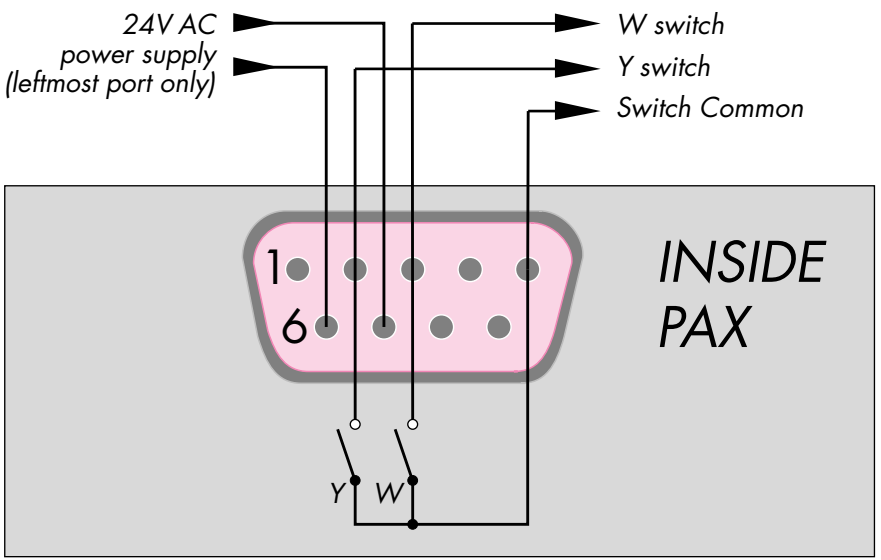
Rear Panel



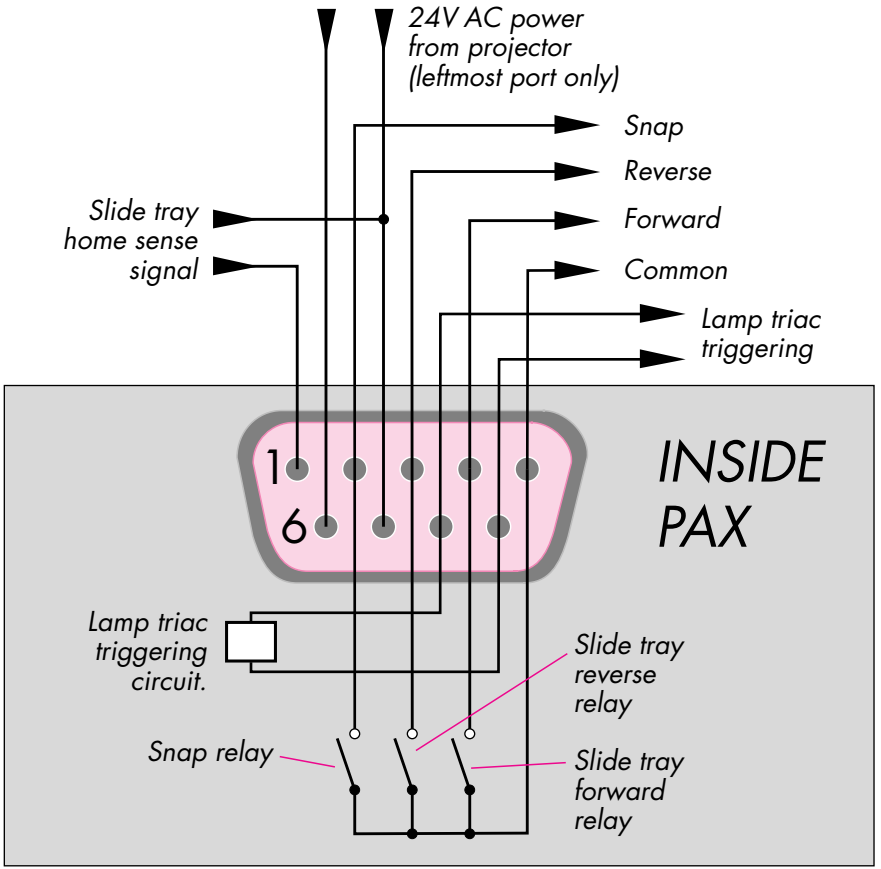
The four ports on the back of the unit connect to the slide projectors, or other devices being controlled, using the appropriate projector adaptor cables or AUXILIARY CABLE (see picture on page 339).

PAX Relay Functions, Wiring Diagram

Power can be supplied to PAX through the leftmost of the four ports (front view). Most slide projectors are capable of supplying power to the PAX in this way. Check the documentation for the particular projector adaptor for details. If the projector can't supply power to the PAX, a separate ACPAX or ACPAX ADAPTOR is needed.



PAX Projector Functions, Wiring Diagram



▼ **IMPORTANT:** All projectors connected to one PAX unit must be powered from the same outlet in order to avoids phasing problems. Projector lamps will not turn off properly if connected to power outlets that are on different phases. Projectors connected to different PAX units, however, may be connected to different outlets or mains phases without any restrictions.

24V AC EXT POWER

AC PAX ADAPTOR (product number 3337) and AC PAX (product number 3338) power supplies.

Connect an ACPAX or ACPAX ADAPTOR to this connector for power supply when not powered by a slide projector.

Dataton rack adaptors have built-in power distribution, allowing you to power up to ten units from a single ACPAX power supply (using an 11 UNIT RACK ADAPTOR, page 341), or two units from an ACPAX ADAPTOR (using a 2.5 UNIT RACK ADAPTOR).

▼ **CAUTION:** When disconnecting the 24 V AC cable, always pull the connector – not the wire. The connector is mechanically secured in the receptacle. Pulling on the wire may cause damage or result in bad contact and malfunction later on.

You can supply a PAX from other power sources as well. PAX will accept either DC or AC voltage in the range 15 to 24 Volt. The current consumption varies between 0.2 and 1 Ampere, depending on the supply voltage and external load.

◆ **NOTE:** When used with slide projectors, DC power can not be used. Furthermore, the AC power supply must be plugged into the same power outlet as any projectors connected to that PAX unit in order to avoid phasing problems.

Projector Adaptors

PAX EKTA ADAPTOR 3432, connects PAX to Kodak Ektagraphic III slide projectors.

A variety of slide projector adaptors are available for interfacing PAX to most projectors equipped with a dissolve control connector. See the latest Dataton product catalog for a list of available projector adaptors, or contact your Dataton dealer for details.

In addition to controlling basic functions such as tray cycling and lamp brightness, some projector adaptors may also support advanced features such as shutter control, electronic home sensing and tray cycle sensing for maximum speed.

- **NOTE:** Use only projectors of the same kind connected to one PAX. Use of different kinds of projectors on different PAX units is possible, but generally not advisable due to differences in the projectors' performance.

Switch Functions

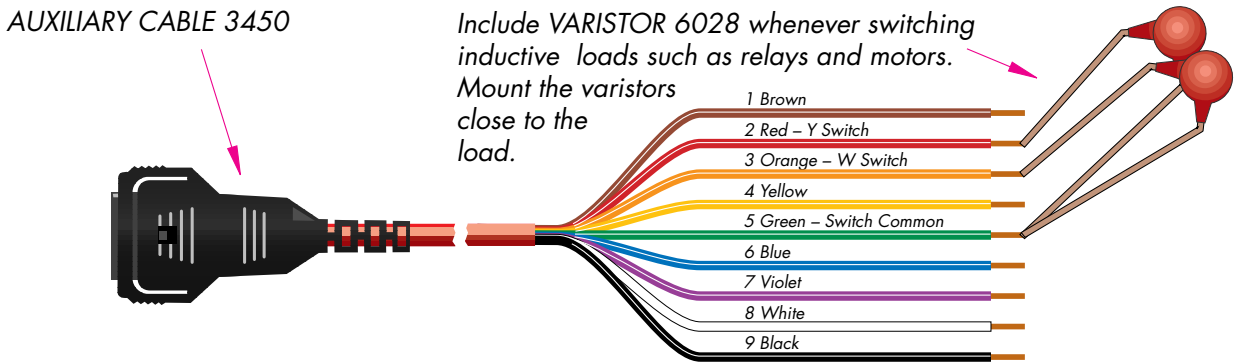
Any output port on a PAX not used for controlling projectors can be used to control two switch relay functions. Such functions are commonly used for various purposes such as rewinding the tape at the end of the show, controlling motorized screens or curtains, etc.

The two relays on each port are called W and Y. Use a separate Switch device in TRAX to control each relay (page 129). Use the Type pop-up menu in the Switch device's configuration dialog box to specify which relay to control. Choose "Dataton:PAX W-Relay" or "Dataton:PAX Y-Relay" when the same PAX is also controlling projectors. Use "Dataton:PAX E AUX W-Relay" or "Dataton:PAX E AUX Y-Relay" when using relays only from a PAX with its OBJECT selector set at E AUX. Enter the port's address into the Port field in the configuration dialog box (see "BANK Selector" on page 361).

▼ **IMPORTANT:** Switch function addresses are allocated right to left on PAX (front view) as opposed to left to right for slide projectors, as shown on page 361.

Use a Dataton AUXILIARY CABLE to connect your own functions to the PAX relays. When controlling inductive loads, such as relays or motors, make sure you use the arc suppression components included with the AUXILIARY CABLE to protect the PAX relays from the high voltage spikes cause by such loads. Connect the arc suppression component across either the load or the PAX relay, as close to the load as possible.

The maximum load for each relay is 24 Volt AC or DC, 1 Ampere. Although one side of both relays is connected to the same pin on the nine pin connector, it is not electrically connected to ground or any other parts inside the PAX. The four ports are galvanically separated from each other as well as the internal parts of the PAX, allowing them to be used for totally separate functions.


AUXILIARY CABLE 3450
Include VARISTOR 6028 whenever switching inductive loads such as relays and motors. Mount the varistors close to the load.
1 Brown
2 Red – Y Switch
3 Orange – W Switch
4 Yellow
5 Green – Switch Common
6 Blue
7 Violet
8 White
9 Black

Power Supply

There are two ways to supply power to the PAX.

- From a slide projector through the leftmost port (front view).
- Through the 24 V AC EXT POWER connector at the back.

PAX normally takes its power from the slide projector connected to the leftmost port. Check the documentation for the projector adaptor appropriate for your slides projectors.

◆ **NOTE:** Only the leftmost port (front view) can be used for powering the PAX in this way.

The 24 V AC EXT POWER input at the back of the PAX is an alternative way of powering the PAX. Use this method if your projectors aren't capable of supplying power, or when using PAX for relay functions only. See "24V AC EXT POWER" on page 365 for more details.

15 TRANSPAX+

TRANSPAX+ interfaces most open reel and cassette recorders to the Dataton control system. It has four main purposes:

- It records timecode onto the tape and then reads it back into TRAX in order to synchronize a timeline with the soundtrack.
- It can record a control signal onto a separate track, allowing you to run the final show from tape without using the computer.
- It can control tape transport functions, either in a basic way using a simple remote control cable, or through a locator adaptor for fully automatic tape positioning (autolocator).
- Together with the PAX projector control unit (page 355), it can translate and play back shows prepared on most other non-Dataton multi-image systems.

Connecting TRANSPAX+

TRANSPAX+ is connected differently depending on the chosen system mode (see "System Modes" on page 16). In the backward compatible system mode, TRANSPAX+ is connected on the primary system bus, usually as the first unit on the bus (see the illustration on page 17). In this case there can only be one TRANSPAX+ in a system.

In the interactive system mode, TRANSPAX+ must be connected through a SMARTPAX port, using a SYSTEM OUT SMARTLINK (product number 3478). Furthermore, any PAX control units must be connected on a separate sub-bus following this TRANSPAX+ (see the illustration on page 19).

The reason for this arrangement is that the primary system bus uses a more sophisticated communication protocol when the system is in its interactive mode. Belonging to an older generation of products, TRANSPAX+ and PAX aren't capable of coping with this protocol. However, by putting them onto a separate, secondary, system cable bus, they can still be incorporated into the same system. In this case, the device driver in the SMARTPAX acts as a mediator between the two buses.

Putting a TRANSPAX+ on a SMARTPAX port also has the benefit of giving it a unique address in the system. While the TRANSPAX+ itself doesn't have an address, the SMARTPAX port to which it is connected has. This allows you to use more than one open-reel deck in a system – which is not the case when TRANSPAX+ is connected on the primary system bus.

You must tell TRAX whether the TRANSPAX+ is on the primary system bus or on a secondary bus by using the checkbox in the Tape device's configuration dialog box (see next section).

Specifying Device Type and Connection Method

In order to use TRANSPAX+ with TRAX, you need to add it as a Tape device to the Device window, and specify the proper device type on the Type pop-up menu in the configuration dialog box.

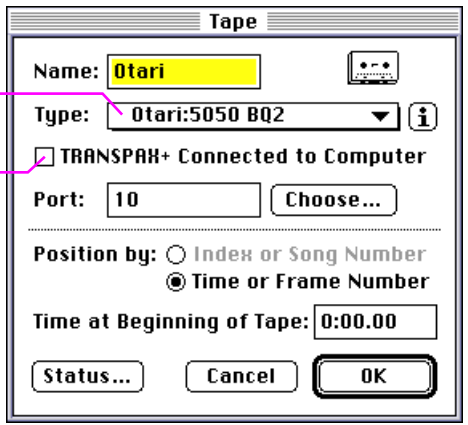
TRANSPAX+ can be used at three levels of sophistication:

- Simply recording and reading timecode and control signals.
- The above, plus basic remote control of the tape deck (play, pause, record, etc.).
- Both the above, plus the ability to locate specific positions on the tape using the recorded timecode as well as other feedback from the tape recorder (auto-locator).

If all you want to do is to record and play timecode and control signals, then choose "Dataton:TRANSPAX+" on the Type pop-up menu. If your tape recorder has provisions for remote control, and you have the correct tape adaptor cable (page 392), you should instead choose "Dataton:TRANSPAX+ with remote" on the Type pop-up menu.

Choose your tape deck here, or select one of the generic Dataton:TRANSPAX+ types.

Select this checkbox if TRANSPAX+ is connected directly to the computer on the primary system cable bus (backward compatible mode only).



If your tape recorder is capable of autolocator control, and you have the appropriate locator cable, you should choose the specific brand and model of tape deck on the Type pop-up menu, such as the "Otari:5050 BQ2" in the example above.

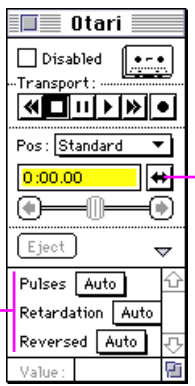
If you use TRAX in its backward compatible mode, you have the option of connecting TRANSPAX+ either directly to the TRAX computer on the primary system cable bus, or on a secondary bus through a SMARTPAX (see "Connecting TRANSPAX+" on page 369). You must tell TRAX how

TRANSPAX+ is connected using the checkbox in the configuration dialog box. This option is not available if TRAX is in its interactive mode, in which case TRANSPAX+ must be connected through a SMARTPAX port.

If connected through a SMARTPAX port, remember to enter the address of that port in the Port field. When connected directly to the computer, it doesn't have a user selectable address, and the Port field is gray.

Configuring the Autolocator

If you use the autolocator feature of the TRANSPAX+ (i.e., your tape recorder is connected to the TAPE CONTROL output of TRANSPAX+ using a locator adaptor cable), you may need to configure the autolocator. This is done using the Pulses, Retardation and Reversed modes of the tape device, which can be seen at the bottom of the tape device's status window.



Enter a time value and click this button to test the autolocator.

Autolocator settings.

All three of these parameters are initially set to Auto. In this setting, they use default values supplied by TRAX, suitable for the selected model of recorder under normal conditions.

However, if you use smaller reels or a different tape speed than normal, you may need to adjust these values. For example, if you choose to run your tape at half speed, you need to explicitly specify the correct number of tacho-pulses per second using the Pulses mode. Likewise, if you use smaller or lighter reels than the standard ones, or a shorter tape, you may need to tweak the Retardation value.

You can tweak these settings in the status window. Try them out by entering a time value in the Position field, and clicking the Locate button. If the tape deck slows down too early, you need to increase the Retardation value. Conversely, if it overshoots, try decreasing the value.

After determining the correct settings for these values, you need to make them a permanent part of your show by entering them into Trigger cues assigned to the tape device (see "Device Specific Mode" on page 208). Put these trigger cues either on a timeline that's always run when the system is started, or at the beginning of each timeline that uses the tape deck.

Tape Signals

Most of the functions of TRANSPAX+ are related to one of the two kinds of tape data signals it can record and play back:

- Timecode
- Control signal

TRANSPAX+ can record and play a variety of such signals. A master tape often uses a timecode track for synchronization purposes. It is also common practice to record a control signal onto the master tape if the show is intended to eventually run from tape rather than from a computer. The control signal can

also be recorded onto – or copied to – a show tape. The show tape can be a cassette, while the master is usually an open-reel tape.

See "Canned Presentations" on page 220 and following pages for an overview of how to use timecode and control signals for preparing various kinds of presentations.

Timecode

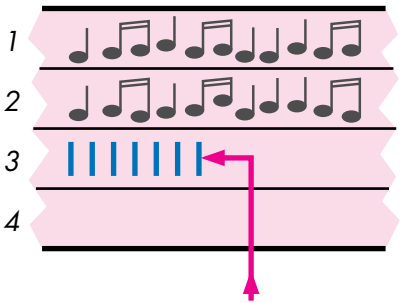
A timecode track allows TRAX to synchronize the cues on a timeline to the sound on tape. The timecode consists of a continuous stream of unique, increasing numbers. By reading these off the tape, TRAX knows exactly where the tape is, and can make sure that the timeline matches up.

TRANSPAX+ can record the following timecode formats:

- EBU 25 frames per second timecode (PAL/SECAM).
- SMPTE 30 frames per second non-dropframe timecode (NTSC).

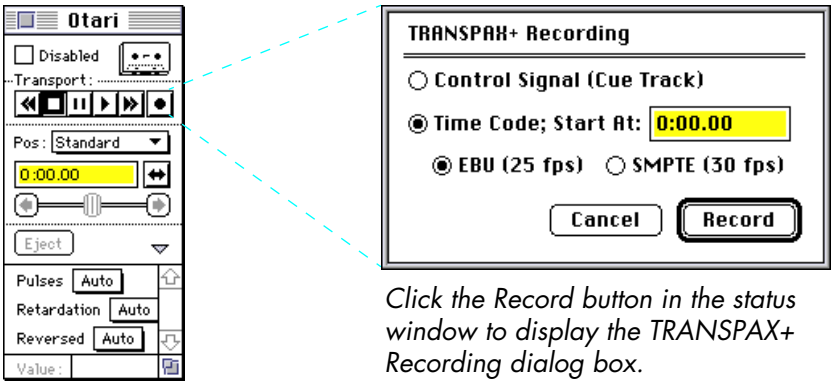
These are industry standard timecode formats which can be used by most professional audio and video systems. Choose EBU or SMPTE depending on which video standard is used in your country. Before using either of these formats, set the TRANSPAX+ CODE selector in the SMPTE/EBU position.

Recording Timecode



Timecode being recorded on a free audio track.

Click the Record button in the tape device's status window to record the timecode. Connect the RECORD output of the TRANSPAX+ to LINE IN on the recorder and set the channel in record mode. When recording, make sure you begin the timecode at least ten seconds before the first cue's position. Adjust the recording level, if possible, for a 0 dB readout on the VU meter. Don't forget to record extra timecode at the end of the show, as it is not possible to extend the timecode afterwards.



Click the Record button in the status window to display the TRANSPAX+ Recording dialog box.

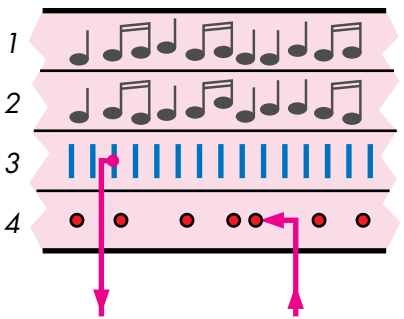
Playing Timecode

To play the timecode, connect LINE OUT of the timecode track to the PLAY input on the TRANSPAX+. You can use the input either on the front or the back. Set the timecode track to Play or Repro mode, play the tape, and adjust the playback level (if possible) until the TAPE OK indicator on the TRANSPAX+ front panel is steady. Make sure the CODE selector on the TRANSPAX+ front panel is set in the SMPTE/EBU position.

The timecode will be displayed in the Position field of the tape device's status window. If you're using the autolocator or remote control feature, then start the tape using the play button in the status window rather than the play button on the player itself.

Please refer to "Synchronizing to Timecode" on page 223 for information on how to synchronize a timeline to the timecode.

Control Signal Recording



The final show can be recorded onto a separate control signal track on the tape. This allows you to run the show without using the computer, simply by feeding the control signal into the first unit in the control unit chain. This can be a TRANSPAX+, a SMARTPAX or a PAX, as they're all equipped with a control signal input on the front panel.

The first unit in the chain will decode the control signal, and then pass it on to the other units through the system cable bus as a high-level, digital signal. As the signal from the tape player to the first unit is a weaker, line-level, audio signal, this cable should be kept short – preferably no longer than two meters. If the tape player needs to be located farther away from the system, a separate TRANSPAX+ can be used up front to decode the control signal, and then pass it on through a longer system cable to the first control unit.

▼ **IMPORTANT:** To record a control signal, TRANSPAX+ must be connected directly to the computer (see "Connecting TRANSPAX+" on page 369) and the system must be in its backward compatible mode. You can not record a control signal while in Interactive mode. See "System Modes" on page 16 for more details.

To record the control signal, connect the RECORD output from the TRANSPAX+ to LINE IN of the track to be used for the control signal. Set that track in Record mode, and set the recording level in the same way as for timecode recording

(see page 375). Make sure that the PLAY input on the TRANSPAX+ is still connected to LINE OUT of the timecode track. Start the tape in record mode, either by clicking the record button in the tape device's status window and choosing Control Signal in the TRANSPAX+ Recording dialog box, or – if your recorder isn't connected to the TAPE CONTROL output of the TRANSPAX+ – by pressing the appropriate buttons on the recorder. Run through the show as usual – the control signal is recorded as you go.

- **NOTE:** The level indicated by the VU meter may fluctuate and show a lower level while recording the control signal. This is due to the sparse modulation scheme used by the control signal. Do not compensate for it by increasing the recording level.

Refer to "Recording a Control Track" on page 225 for more details on recording the control signal.

Control Signal Playback

To play the control signal, connect it to the PLAY or TAPE input of the first unit in the system and start the tape. For final playback, you generally don't need the TRANSPAX+. In this case, disconnect the TRANSPAX+ from the rest of the system, and connect the control signal directly to the first control unit.

If you prefer to keep the TRANSPAX+ connected, then quit TRAX and disconnect the computer from the TRANSPAX+.

- **NOTE:** You must quit TRAX before disconnecting the TRANSPAX+. If you forget this, you can momentarily disconnect the power to the TRANSPAX+ in order to make it play the control signal properly.

While playing a Dataton control signal through a TRANSPAX+ in this way, a re-generated copy of the control signal is provided on the RECORD connector. This can be used to duplicate a tape with its control signal.

Other Control Signals

TRANSPAX+ can play, but not record, control signals or cue tracks produced by most other professional multi-image systems using any of the following formats:

- Procall 5 and Procall X (AVL).
- Mate-Trac (Arion and Kodak PDC).
- Alphasync (Electrosonic).

To play a show recorded in any of these formats, set the CODE selector accordingly and play the control signal into the TRANSPAX+. TRANSPAX+ decodes and translates the signal into an intermediate format, which is then further interpreted by the PAX dissolve unit. When receiving this signal, PAX will emulate all aspects of the original show, including dissolve curve characteristics, flashes, loops, and other features specific to each system.

▼ **IMPORTANT:** This feature works only in conjunction with the PAX dissolve unit. Specifically, it does not work with SMARTPAX, even if used with slide projectors only.

Front Panel

IN Connector

When using the system in its backward compatible mode (page 16), connect the computer to the IN connector using the gray TRAX cable. If you're using both ports on the computer (page 111), then connect TRANSPAX+ to the modem port. When using the system in its interactive mode (page 18), connect IN to a SMARTPAX port using a SYSTEM OUT SMARTLINK (product number 3478). See "Connecting TRANSPAX+" on page 369 for more details.

The cable connected to IN can be extended using a Dataton system cable (0.4, 1, 2 and 5 meter lengths) or the SYSTEM CABLE KIT for custom lengths up to a maximum of 100 meters. Dataton system cable has a male connector at one end and a female connector at the other which makes daisy-chaining multiple cables easy.

OUT Connector

The OUT connector links to the next control unit in the chain. The cable between the OUT connector on the TRANSPAX+ and the next unit must not be more than 25 meters as TRANSPAX+ takes its power from the next unit through the cable. Alternatively, you can supply TRANSPAX+ locally through its 24 V AC EXT POWER input, in which case the system cable can be up to 100 meters long (see "Power Supply" on page 393).

- **NOTE:** When using the system in its interactive mode, any PAX units must be connected as a secondary bus through the OUT connector of the TRANS-

PAX+. This applies to PAX only – not to SMARTPAX. See "Connecting TRANSPAX+" on page 369 for more details.

The data sent to the next unit through the OUT connector is a high-level digital signal. The signal is optically isolated and re-shaped in each unit to ensure maximum reliability even in very large systems.

PLAY Connector

The PLAY input accepts most timecode and control signal standards, as determined by the CODE selector (page 384).

When playing timecode, the timecode is sent backwards through the IN connector to the computer (either directly or through a SMARTPAX port), where it can then be used to synchronize a timeline with the audio tape.

When playing a control signal (sometimes called a cue track), first quit TRAX then play the control signal into TRANSPAX+.

When playing a Dataton control signal through TRANSPAX+, a re-generated signal is available on the RECORD output for tape duplication purposes.

TRANSPAX+ decodes the timecode or control signal, and passes it on as a high-level, digital data stream. As the signal that comes from the tape player is a relatively weak audio level signal, the cable between the tape player and the TRANSPAX+ should be kept as short as possible, preferably no longer than two meters.

You can monitor the quality of the received tape signal by watching the TAPE OK indicator. Although the other units in the chain also have TAPE/DATA OK indicators, only the first unit's indicator will accurately indicate the tape signal's quality. The indicator should remain on all the time while playing the tape. Intermittent flickering indicates poor quality or a weak signal. Try adjusting the playback level to correct the problem.

Here are some specifications of the PLAY input which might be helpful when troubleshooting an installation:

Input sensitivity: 150 mV peak relative ground.

Input impedance: 10 kOhm.

Tape speed tolerance; control signal: ±20%, timecode: ±15%.

- **NOTE:** Due to the sparse modulation scheme used by the Dataton control signal, it appears as very weak on most regular VU meters or when using an averaging volt meter connected to the tape output. Use an oscilloscope to check the output level, if required.

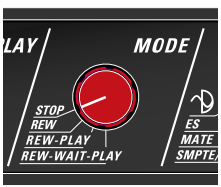
TAPE OK Indicator

The TAPE OK indicator is turned on when a proper signal is received through the PLAY connector. It also indicates the quality of the signal. If the indicator flickers frequently, it means that a poor quality or low-level signal is received.

- **NOTE:** The TAPE OK indicator on the TRANSPAX+ is different from those on PAX and SMARTPAX in that it only indicates that a proper signal is being received through the PLAY input. It doesn't monitor the IN connector as it does on those other units.

If the TAPE OK indicator fails to come on even though you know you're playing a signal into the PLAY input, the signal on the tape may be of a different type than the current setting of the CODE selector. Try changing the setting of the CODE selector slowly, one position at a time, until the TAPE OK indicator comes on. See "CODE Selector" on page 384 for a list of the various settings.

MODE Selector



The MODE selector determines the operation mode of the TRANSPAX+ when using its auto-present functions. This makes it possible to have the TRANSPAX+ automatically stop or rewind the tape when the end of the control signal is reached, as well as optionally re-starting the show.

In order to use these features, first quit TRAX and disconnect the computer. The tape player must be connected to the TAPE CONTROL output of the TRANSPAX+ using a suitable remote control cable or locator adaptor.

STOP. Stop the tape at the end of the control signal.

REW. Rewind the tape at the end of the control signal.

REW-PLAY. Rewind the tape and re-start it.

REW-WAIT-PLAY. Rewind, wait and then re-start it.

The action performed according to the setting of the MODE selector is triggered by the disappearance of the control signal. Thus, if you manually stop the tape, TRANSPAX+ will also perform the selected action. To avoid this, simply disconnect the TAPE CONTROL connector.

When using any of the rewinding modes with an open-reel tape player, the player must be equipped with a beginning-of-tape sensor. This tells TRANSPAX+ when to stop rewinding the tape. See "TAPE CONTROL Connector" on page 388 for more details.

The REW-PLAY mode will automatically re-start the tape. If a beginning-of-tape sensor is used, the tape will be re-started as soon as the beginning of the tape is reached. If a sensor isn't used (for example if you're using a cassette player), TRANSPAX+ will re-start the tape two minutes after initiating the rewind.

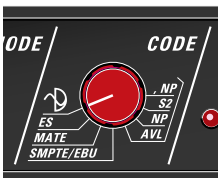
The REW-WAIT-PLAY mode is similar to the REW-PLAY mode, but adds an eight minute delay between the end of the rewind and the re-start. If you're not using a beginning-of-tape sensor this means that there will be a ten minute break between shows, as the rewind time is then fixed at two minutes. If you use a sensor, the total time will be the actual rewind time plus eight minutes.

CODE Selector

The CODE selector determines the type of tape signal accepted by the PLAY input.

If set incorrectly, the TAPE OK indicator will remain off even if a signal is being fed into the PLAY input. In this case, try changing the setting of the CODE selector slowly – one position at a time – until the TAPE OK indicator comes on.

Dataton



Use this position to play a Dataton control signal through the TRANSPAX+. This is useful if the tape player is located far away from the first PAX or SMARTPAX. However, in most cases you can do without the TRANSPAX+ and play the control signal directly into the TAPE input of the first PAX or SMARTPAX unit in the chain.

When playing a Dataton control signal through the TRANSPAX+ in this way, a re-generated signal will appear on the RECORD output. This can be used when duplicating show tapes in order to get a first generation copy of the control signal.

SMPTE/EBU

Use this position together with TRAX to read standard SMPTE or EBU timecode from tape. TRANSPAX+ auto-detects the type of timecode that's being used and passes it on to the computer.

If you want to play a Dataton control signal through the TRANSPAX+, you must set the CODE selector to its Dataton position. Don't forget to set it back to SMPTE/EBU when using the computer, or TRANSPAX+ will fail to recognize the timecode.

ES

Use this position to play shows originally produced on Electrosonic equipment using the Alphasync control signal format. This format is used by the ES 4000 series of control units. Older Electrosonic equipment use other formats which are not compatible with TRANSPAX+.

Connect up to eight PAX dissolve units to the OUT connector of the TRANSPAX+ and set their bank selectors at 1L, 2L, 3L, etc., according to the original show programming. Each PAX unit can control up to three slide projectors when running Electrosonic shows.

If the program uses auxiliary relay functions, those are also emulated using the fourth output port on each PAX:

ES	*PAX pin*
A	3
B	2
C	4

Pin 5 on the PAX is common for all three relays.

MATE

D C B A

Auxiliary relay functions on separate PAX set to 1L and E AUX.

Use this position to play shows originally produced on Arion equipment using the Mate-Trac format. This format is also used by the Kodak PDC two-projector dissolve unit, and some other manufacturers.

Connect up to four PAX dissolve units to the OUT connector of the TRANSPAX+ and set their bank selectors at 1L, 2L, 3L and 4L, according to the original show programming. Each PAX unit can control up to four slide projectors.

- **NOTE:** If the show is programmed for multiple two-projector control units, the same number of PAX units are needed to run the show.

If the program uses auxiliary relay functions, those are also emulated using a separate PAX, which must be set to BANK 1L and OBJECT E AUX:

Arion	*PAX pin*
1	3
2	2
3	4

Pin 5 on each PAX port is common for all three relays on that port.

AVL

Use this position to play shows originally produced on AVL equipment using the Procall-5 or Procall-X control signal formats (PosiTrak). TRANSPAX+ does not read shows produced on Enhanced Procall.

Connect up to five PAX dissolve units to the OUT connector of the TRANSPAX+ and set their bank selectors at 1L, 2L, 3L, etc., according to the original show programming. Each PAX unit can control up to three slide projectors when running AVL shows.

- NOTE: Shows using more than 15 projectors use a second tape track. In this case, an additional TRANSPAX+ is needed to play the show.

If the program uses auxiliary relay functions, these are also emulated using the fourth output port on each PAX:

AVL	*PAX pin*
L	3
R	2

Pin 5 on the PAX is common for both relays.

In the AVL position, TRANSPAX+ uses the full set of features supported by that system. The other three positions can be used for special purposes, or for compatibility with older shows:

NP. The NP position, located just above the AVL position, disregards the Posi-Trak tray positioning information.

S2. Selects the Sequence 2 mode, for compatibility with old two projector shows. In this case, use only the first and third port on each PAX.

,NP. This position, located just above the S2 position, combines the NP and S2 modes.

HOME Button

Press the HOME button on the TRANSPAX+ to reset all devices to their home positions. The indicator below the button will light up when the button is pressed and will go off when all devices are ready.

- **NOTE:** This button doesn't work while TRAX is active. Instead, use TRAX to home all devices using a Trigger:Reset cue (page 209).

Rear Panel

24V AC EXT POWER

Connect an ACPAX or ACPAX ADAPTOR here for power supply, if this is not supplied by the next unit in the chain. Dataton rack adaptors have built-in power distribution, allowing you to power up to ten control units from a single ACPAX power supply (using an 11 UNIT RACK ADAPTOR, as shown on page 341), or two units from an ACPAX ADAPTOR (using a 2.5 UNIT RACK ADAPTOR).

▼ **CAUTION:** When disconnecting the 24 V AC cable, always pull the connector – not the wire. The connector is mechanically secured in the receptacle. Pulling on the wire may cause damage or result in bad contact and malfunction later on.

You can supply a TRANSPAX+ from other power sources as well. It will accept either DC or AC voltage in the range 15 to 24 Volt. The current consumption varies between 0.2 and 1 Ampere, depending on the supply voltage and external load.

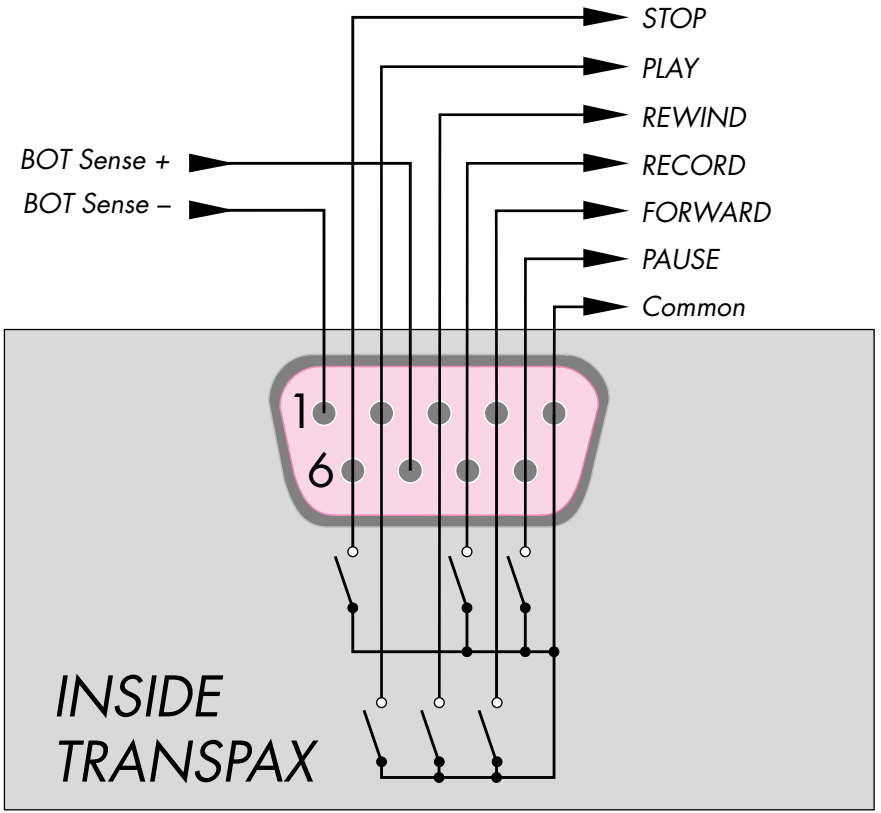
POWER CONTROL Connector

The POWER CONTROL connector isn't supported by TRAX.

TAPE CONTROL Connector

To control tape transport from TRAX, connect a tape remote or a locator adaptor cable from the TAPE CONTROL output to your recorder. Most professional recorders have a remote control socket on the back for basic tape trans-

port functions. High-end open-reel recorders often have a more sophisticated connector intended for connecting an autolocator or synchronizer.



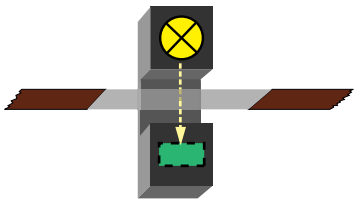
Wiring diagram for the TAPE CONTROL connector.

A wide range of cables suitable for most brands of professional tape recorders is available (see the Dataton product catalog). Check with your Dataton dealer for details on specific models.

For basic remote control functions, you may also be able to make a simple cable based on the AUXILIARY CABLE (product number 3450), which comes with a "pigtail" at one end for soldering the appropriate connector (see the picture on page 339).

When using an autolocator adaptor cable, you must also configure the corresponding Tape device in TRAX accordingly. You may also have to adjust the autolocator parameters for your recorder, as described under "Configuring the Autolocator" on page 372.

A beginning-of-tape sensor can be connected to TRANSPAX+ to improve reliability when using open reel recorders in fixed installations. Without this sensor, the tape can accidentally be rewound off the take-up reel. The sensor can be retro-fitted to most open reel recorders, and can be implemented using either transmissive or reflective methods. In either case, it usually consists of a light source and a sensor – often integrated into one component. Wire the sensor to the TAPE CONTROL input in such a way that it will apply 5 V DC across pin 7(+) and 1(–) when at the beginning of the tape.



A transmissive beginning-of-tape sensor.

In addition to this sensor, the tape must be prepared by splicing in a transparent or reflective leader. Make this leader at least 12 meters (40 feet) long to guarantee that the tape will stop gracefully even when winding at maximum speed and with large tape reels.

When TRANSPAX+ receives the beginning-of-tape signal, it will stop the tape. If the rewind was triggered by reaching the end of the control track, as determined by the MODE selector, TRANSPAX+ will proceed according to the MODE setting (page 382).

RECORD Connector

This output is used to record timecode or control signals onto tape. Connect it to the LINE IN input on the desired tape channel. Proceed as described under "Tape Signals" on page 373.

- **NOTE:** While recording a control signal, the level indicated by the VU meter may fluctuate and appear to be lower than a timecode signal level. This is normal; do not compensate for it by increasing the recording level.

The output signal on the RECORD connector is 1 V peak over 10 kOhm. The signal frequency varies between 1 and 3 kHz depending on type of signal.

PLAY Connector

This input serves the same purpose as the PLAY input on the front. Use only one of these inputs at a time.

Tape Adaptors

A range of adaptor cables is available for controlling most professional tape recorders through the TAPE CONTROL output. This offers the following capabilities:

- Auto-present functions using cassette or open reel players, for fixed installations. Use the MODE selector to choose the desired function for stand-alone operation, or program the transport functions through TRAX.
- Basic remote control functions, using the device's status window in TRAX.
- Full autolocator capabilities, together with most professional open reel recorders equipped with a locator or synchronizer socket.

The autolocator feature is a great time-saver when producing presentations. As you move along a timeline, the tape can be automatically positioned accordingly.

For recorders not equipped with autolocator capabilities, you may be able to use a simple remote control cable for basic tape transport functions. This also allows you to take advantage of the auto-present functions built into TRANSPAX+.

See "TAPE CONTROL Connector" on page 388 for more details. Contact your Dataton dealer for information on compatibility with specific tape recorders.

Power Supply

An AC PAX ADAPTOR (product number 3337) or AC PAX (product number 3338) can be used to power a TRANSPAX+.

There are two ways to supply power to TRANSPAX+.

- From a PAX or SMARTPAX control unit connected to OUT.
- Through the 24 V AC EXT POWER connector at the back.

TRANSPAX normally takes its power from the next unit connected through the OUT connector. In this case, the maximum length of the cable between the TRANSPAX+ and the next unit is 25 meters.

The 24 V AC EXT POWER input at the back of the TRANSPAX+ is an alternative way of powering it. Use this method if the control unit to which the TRANSPAX+ is connected isn't capable of supplying power, or if a longer cable than 25 meters is required. See "24V AC EXT POWER" on page 388.

◆ **NOTE:** When connecting a TRANSPAX+ through a SMARTPAX port (see "Connecting TRANSPAX+" on page 369), it does not receive power from the SMARTPAX port. If there's no control unit connected to the OUT connector on the TRANSPAX+, you must supply it through its 24 V AC EXT POWER connector.

A NEWS IN TRAX 3

This appendix describes the main differences between TRAX versions 2 and 3. If you've used TRAX version 2, this appendix may be particularly helpful as it contains pointers to other relevant parts of this manual, which you need to read in order to take full advantage of the new features introduced in version 3.

Overview

Most of the new features in TRAX version 3 revolve around three things:

- The ability to run multiple timelines and other tasks simultaneously.
- Active inputs to TRAX from the outside world, such as buttons and sensors.
- The TOUCHLINK touch panel.

Multiple Timelines

In TRAX version 3, you can have as many timelines as you want. New timelines are created using the New Timeline command on the Window menu (page 102). To open an already existing timeline, double-click its name in the Task window (see "Opening a Timeline Window" on page 29). A timeline can be started either manually, by pressing the space bar while the timeline window is active, or automatically according to its starting condition in the Task window (see "Specifying the Starting Condition for a Task" on page 53).

As each timeline can potentially control any devices, a number of mechanisms have been implemented in order to keep things straight:

- Device Ownership (see "Device Ownership" on page 121).
- Task Priority (see "Changing a Task's Priority" on page 52).
- Task Life span (see "Stopping vs. Pausing a Timeline" on page 42).

Active Inputs

The ability to run multiple tasks would be of little use if there were no inputs to TRAX by which these tasks could be started. Hence, TRAX version 3 supports active inputs through SMARTPAX, which feed back information from the system to the corresponding devices inside TRAX (see "Digital Input Functions" on page 331).

This information can then be combined into arbitrarily complex starting conditions for the tasks (see "Specifying the Starting Condition for a Task" on page 53).

- **NOTE:** TRAX must be in its "Interactive" system mode in order to use such inputs. See "System Modes" on page 16.

Another kind of active input, which goes hand in hand with multiple timelines, is the ability to synchronize any timeline to any device in the system capable of supplying timing information. This includes most tape and disc devices. See "Synchronizing a Timeline to a Device" on page 42.

TOUCHLINK

Touch panels are commonly used in both interactive applications and for more traditional environment and remote control functions. TRAX version 3 includes all you need to design an elegant user interface for your presentation, as well as integrating it into the system seamlessly. Learn all about this in Chapter 6.

Windows

Some specialized windows from TRAX version 2, such as the Note and Tape Control window, have been removed. Their functionality has been incorporated into devices, as described below. Most other windows have been enhanced.

Timeline Window

There's one small but important change in the timeline window; it now has four buttons in the lower left corner instead of three. The Pause button is new, and corresponds functionally to the Stop button in TRAX version 2. The Stop button now permanently stops the timeline. This is indicated by a gray numeric time readout in the timeline window. While a timeline is stopped in this way, it doesn't control any devices. Thus, you may move back and forth along such a timeline without affecting the devices.

In TRAX version 2, going back to the beginning of the timeline automatically reset all the devices to their home positions. This is not necessarily the case in TRAX version 3, as the status of the devices may have been set by other means before the timeline was started, i.e. by another timeline, or directly by the user through a touch panel. Instead, each device used by a timeline regards the status it had when the timeline first took control over it as its correct home position. If you want the devices to always return to their home positions at the beginning of a timeline, put a Trigger:Reset cue at the beginning of that timeline and assign it to all those devices. See "Reset (Home)" on page 209.

Timeline Settings

The Timeline Settings dialog box is displayed by choosing the corresponding command on the Window menu when a timeline window is active (see "Timeline Settings" on page 103). In this dialog box you can name the timeline and specify other details, such as its beginning and end.

A checkbox allows you to determine whether the timeline should stop automatically after running past its last cue. This automatically frees up any devices it has acquired, allowing them to be controlled by touch panels or other timelines (see "Device Ownership" on page 121).

The two fields at the bottom of the Timeline Settings dialog box indicate whether the timeline is synchronized to a device or another timeline, and whether there's any offset between the device's time position and the timeline's. The synchronization of timelines is managed by the revised Control cue (see "Synchronize To" on page 214).

Tape Control Window

The old Tape Control, Tape Settings and Record Timecode windows are gone, along with their menu items. Their functionalities have been added to the regular Tape device, using new device drivers for the open reel and cassette recorders controlled through TRANSPAX+.

You can control TRANSPAX+ either directly from the computer or through a SMARTPAX. The direct control method works only in "Backward Compatible" mode (see "TRANSPAX+ Connected to Computer" on page 133).

Auto-locator settings are handled through device specific modes in the tape device. Use Trigger cues as appropriate to set these parameters if desired.

There's no longer any implied synchronization between the tape recorder and the timeline, as in TRAX 2. As it is now possible to have any number of tape devices as well as timelines, that would not be practical. Instead, you must use a Control cue to explicitly state to which device a timeline should be synchronized. See "Synchronizing to Timecode" on page 223.

See Chapter 15 for more details on how to use TRANSPAX+ with TRAX.

Note Window

The Note window is gone, together with its associated settings at the bottom of the Window menu. Its functionality has been taken over by the new Text device and its status window (see page 151).

Task Window

This window is new. It is the home of all the new, sophisticated multitasking in TRAX version 3. See "Task Window" on page 51.

Device Status Windows

Each device in the Device window has a new status window that can be opened, and – if desired – left open on the screen. This is in addition to its configuration dialog box. The status window is opened by selecting the device's icon and choosing Show Device Status on the Object menu. Refer to each device in Chapter 5 for full details.

Device Support Window

The old SMARTPAX Drivers window has been re-named "Device Support". It now lists all devices, even those controlled through PAX and TRANSPAX+. All non-SMARTPAX devices are shown in italics.

This window also manages downloading of panel designs to TOUCHLINK. A pop-up menu at the bottom of the window allows you to specify what you want to download before clicking the Download button.

See "Device Support" on page 63 for more details.

▼ **IMPORTANT:** It is not possible to download device drivers to SMARTPAX units equipped with system software version 2.3 or earlier when TRAX is in its Interactive mode. The SMARTPAX system software version is shown briefly in the display when the SMARTPAX is switched on. If you have problems downloading device drivers, you may have to temporarily set the system mode to "Backward Compatible" in the Preferences dialog box (page 16).

Menus

The menu structure of TRAX version 3 is similar to version 2, with only minor alterations.

File

All tape and timecode related commands on the File menu have been removed. These functions are now incorporated in the Tape device (see page 375).

The ability to import devices has been removed. You can import devices from other shows by copying them and pasting them into the new show. The ability to run using the mouse as a remote control has been removed. Speaker support presentations can be run from an AIRLINK remote control unit instead.

Edit

The new "Send to Back" and "Bring to Front" commands are used to change the front-to-back ordering of panel items such as buttons and sliders. See "Bring to Front, Send to Back" on page 84.

Object

The new "Show Device Status" command is used to open the status windows of the selected devices. Alternatively, you can Option-double-click on the device to open its status dialog box. There's also a check-box in the Preferences dialog box that allows you to reverse the behavior of double-clicking a device so that it will, by default, open it status window, in which case Option-double-clicking will open the configuration window instead.

Symbol

TRAX version 3 has a new Symbol menu, which is used as an aid when entering start conditions for tasks. See "Symbol Menu" on page 96.

Window Menu

The Window menu has been simplified. The "Big Notes" and "Black Notes" items, previously used to control the Note window's appearance, are gone (together with the Note window itself). Corresponding selections for the new

Text device's status window can be made in its configuration dialog box (see page 151).

As TRAX can now have as many timeline windows as you want, the timeline window is no longer listed on the Window menu. To open a timeline window, double-click the timeline's name in the Action column of the Task window.

The old "SMARTPAX Drivers" menu item is superseded by the "Device Support" item, as it now also includes devices controlled through PAX and TRANSPAX+ as well as handling downloading of panel designs to TOUCHLINK.

Keyboard shortcuts are provided for most items on the Window menu.

Devices

The functionality of most of the devices remains the same, with only minor alterations and enhancements.

The name of the old ASCII device has been changed to Serial. Likewise, what used to be called ASCII drivers are now called Serial device drivers. The CD device is now called Audio Disc, and the former LaserDisc is now called Video Disc.

Device Port Selection

The port assignment (previously called "Address") can still be typed straight into the Port field of each device's configuration dialog box. However, an additional dialog box is now provided for entering the various parts of the port assignment in a more intuitive way. This dialog box is accessed by clicking the Choose button next to the Port field in the device's configuration dialog box. Here, two radio buttons let you select which computer port to use (previously this was done by adding 100 to the address).

Device Ownership

As TRAX 3 can have many timelines running at the same time, conflicts may occur when a timeline wants to use a device. If the device is already owned by another timeline with the same or higher priority than the new timeline trying to access it, the new timeline will not be granted access to the device. The device is said to be "owned" by a task (see "Device Ownership" on page 121).

Thus, when a device doesn't work the way it's supposed to, check if it is already owned by some other timeline. This can be done by opening the device's configuration dialog box. If the device is currently owned, the owner's ID number will be stated in the title bar of the configuration dialog box. Open the Task window and look up the task by its ID number.

Virtual Devices

Some devices can be designated as "virtual" devices using a radio-button in their Configuration dialog box. This includes the Switch, Level, Still Store, Text and Time devices. Such a virtual device works like a real device in most aspects, except it has no physical counterpart. Hence, it does not need a port address, and can only be used internally in TRAX (see "Virtual Devices" on page 122).

These devices are useful primarily together with panels, and as variables in starting conditions for tasks. See the example under "System Status Tracking" on page 252.

Switch Device

The Switch device has been enhanced to support both output and input functions. Input functions are supported for DIGITAL SMARTLINK, AIRLINK and MIDI (note on/off messages). See "Switch" on page 129.

To activate the input function, open the device's configuration dialog box, select the device driver on the Type menu, then select Output, Input or Both, as

appropriate. Some devices may support only input or output functions, in which case the other options will be grayed out.

- **NOTE:** TRAX must be in its "Interactive" system mode in order to use such inputs. See "System Modes" on page 16.

The "Mutually Exclusive in Group" option in the Switch device allows you to specify that only one switch in a group of switches may be activated at a time. This is useful, for example, when controlling curtains or screens, where you do not want to activate both the "open" and "close" switches simultaneously (page 130).

Tape Device

The Tape device has been enhanced to handle TRANSPAX+ related functions. This made it possible to remove the separate Tape Control window. TRANSPAX+ can be connected directly to the computer, as before, when the system is used in its "Backward Compatible" mode (page 16). This is specified by a checkbox in the Tape device's configuration dialog box (page 133).

Alternatively, TRANSPAX+ can be connected through a SMARTPAX port, as a kind of "open reel smartlink". This is the only way to use TRANSPAX+ when TRAX is used in its "Interactive" mode. The Tape device also has the ability to record timecode.

The ability to locate Index numbers has been added to the Tape device. Recording and Eject functions have been added to the Tape, Video and Audio Disc devices, as well as in the Trigger cue.

- **NOTE:** Initially, few of the device drivers support these features. Check the device information database entry for individual devices for the latest news.

Panel Device

The new Panel device is used together with TOUCHLINK. Its status window provides all the tools for creating and editing buttons, sliders, graphics and other panel items. The functionality is provided either by direct linkage to devices, or through tasks in the Task window. The panel design is downloaded into TOUCHLINK in the same way as device drivers are downloaded into SMARTPAX. See Chapter 6 and Chapter 12 for full details.

Text Device

The new Text device has three purposes:

- To substitute for the old Note window. You can now have as many note windows as you want.
- To put text into display items on panels.
- To talk to LED signs, printers, data monitors and other similar devices. Initially, there are no device drivers available for such devices.

The Note cue must now be assigned to a Text device in order to have any effect (in TRAX version 2, the Note cue was implicitly assigned to the Note window). Checkboxes in the Text device's configuration dialog box allow you to specify larger font or white-on-black text, as previously specified using items on the Window menu.

▼ **IMPORTANT:** When importing TRAX 2 shows into TRAX 3, you must manually add a Text device and assign all Note cues in the show to it, or the notes will not be displayed. See "Using Shows Made on TRAX 2" on page 405.

See "Text" on page 151 for all details about this new device type.

Time Device

The new Time device has the following purposes:

- To allow tasks to be triggered depending on the time of day, day of week, month, etc.
- To act as a general purpose "timer". It can be set using a Locate cue, and started and stopped using a Trigger:Play cue just like a Tape or Disc device.
- To provide a generic timecode input to TRAX from the outside world, allowing a timeline to be synchronized to any timecode source. Initially, there are no device drivers available for this purpose.

See "Time" on page 152 for full details about this new device.

Cues

Most cues have not changed from TRAX version 2. A new use of all cues is that they can also be entered into the Task list. This allows you to create single-cue tasks.

Locate and Trigger Cues

The Trigger cue has three new functions:

- Reset devices to their power-up status.
- Record.
- Eject.

◆ **NOTE:** Initially, few of the device drivers support Record and Eject. Check the device information database entry for individual devices for the latest news.

In addition, both the Locate and Trigger cues apply to the new Time device when used as a programmable timer. To use it as a programmable timer, open

the Time device's configuration dialog box and select Virtual (see "Timer" on page 259).

Control Cue

The Control cue (formerly called System cue) has been enhanced significantly in order to manage the multiple timelines as well as the ability to sync timelines to different devices. Read all about the revised Control cue on page 212.

Note Cue

The Note cue looks like before, except that the "Don't display in Note window" checkbox has been removed. Instead, the Note cue can now be assigned to one or many Text devices. By keeping the Text device's status window open, you will get the same effect as the old Note window.

Preferences

The Preferences dialog box has one important addition; the System Mode radio buttons allow you to switch TRAX 3 between its "Interactive" and "Backward Compatible" modes. This is an important distinction, since it determines both the physical arrangement of control units (SMARTPAX, PAX, TRANSPAX+) in the system, as well as the capabilities in terms of interactivity and active inputs.

See "Preferences" on page 108 and "System Modes" on page 16.

Using Shows Made on TRAX 2

TRAX version 3 can open shows created using older versions of TRAX. However, due to the number of changes in TRAX 3, such shows may not always perform as expected without manual adjustments. For this reason, it may be a good idea to keep your previous version of TRAX on your hard disk as well. Shows saved by TRAX version 3 have a different icon than shows saved by earlier TRAX versions. This allows the Mac OS Finder to start the correct TRAX version when you double-click a show file.

If you choose to keep both the new and old TRAX versions on your hard disk in this way, there are a few things you should keep in mind:

- Don't run both TRAX versions at the same time. Only one program at a time can use the serial port on the computer.
- Always use TRAX version 3 to download device drivers to SMARTPAX if you're using both versions with the same rig. TRAX version 2 can use most drivers that have been downloaded using version 3, but not vice versa. This is particularly important if you use the Interactive system mode of TRAX 3.

If you choose to convert an older TRAX show for use with TRAX 3, these are the steps you need to take:

- Add a Tape device to replace the old Tape Control window, if used.
- Add a Control cue up front on the main timeline to establish the synchronization relationship to the tape recorder, if applicable.
- Add a Trigger:Reset cue at the beginning of the main timeline to ensure that all devices start out at their home positions.
- Add a Text device to replace the old Note window, if used.
- Activate the Interactive system mode in the Preferences dialog box to take full advantage of all the new features.

The following is a detailed description of each of those steps.

Add a Tape Device

The separate Tape Control window in TRAX version 2 has been removed in TRAX version 3. Instead, add a Tape device and configure it for your recorder as described in Chapter 15.

Add a Control Cue to Synchronize the Timeline

There's no implied synchronization between the tape device and the timeline in TRAX 3, as was the case in version 2. You must establish this explicitly using a Control cue, as described under "Synchronizing to Timecode" on page 223.

This not only allows you to have different timelines synchronized to different devices. It also allows you to switch sync sources at any point along a timeline.

Add a Trigger cue to Reset the Devices

As you can now have multiple timelines, it would be impractical to have all devices in the system return to their home positions whenever a new timeline is started. Instead, each timeline will accept the initial status of the devices as their correct home positions. Thus, when you return to the beginning of that timeline, all devices used by it will be reset to the position they had when the timeline was started.

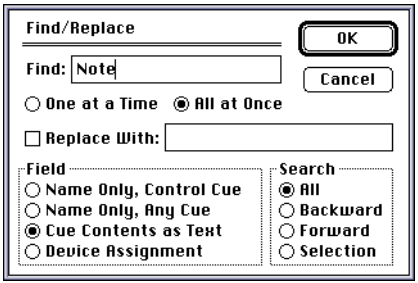
If you want all devices to be reset to their power-up positions at the beginning of a timeline, you must explicitly say so using a Trigger:Reset cue (page 209).

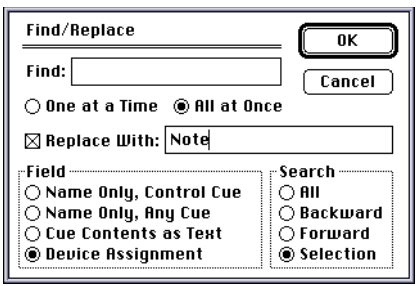
Activate the Interactive System Mode

To take full advantage of the new features in TRAX version 3, you must activate its Interactive mode (see "System Modes" on page 16). This is done in the Preferences dialog box, as shown on page 112.

Before activating the Interactive system mode, you must make sure that only SMARTPAX units are connected to the system bus originating from the computer. Any TRANSPAX+ and PAX units must be on a secondary bus, connected through a SMARTPAX port (see "Connecting TRANSPAX+" on page 369). You must also make sure that all SMARTPAX units in the system have been upgraded to system software version 3 or later (see page 320). This can be done by performing an automatic download before activating the Interactive system mode (see "Downloading in Automatic Mode" on page 68).

Using a Text Device to Display Note Cues





The separate Note window of TRAX version 2 has been removed in TRAX version 3. The new Text device takes over its functionality. To make the text from a Note cue show up in the status window of a Text device, simply assign the Text device to the Note cue.

After creating a new Text device named "Note", you can automate the process of assigning all the Note cues to it using the Find/Replace command. Start by selecting the timeline window and making a Find on all cues that contain the word Note, as shown in the picture to the left. Be careful to set all options exactly as show to the left.

After that first Find command, all the Note cues along the timeline should be selected. You may scroll the window back and forth to confirm that your note cues have been selected. Don't leave the window, though, as doing so will de-select those cues.

Next, you can replace the blank device assignment of all those cues with the name of your new Text device. Assuming that you gave the text device the name "Note", use the Find/Replace command again. This time, configure it exactly as shown in the second Find/Replace dialog box to the left.

This will replace all blank device assignments of selected cues with an assignment to the device named Note.

Finally, open the status window for the Note device, using the "Show Device Status" command on The Object menu, and run the timeline to verify that the note cues display properly. You can select a larger typeface or black background in the configuration dialog box for the Text device, if desired.

B GLOSSARY

action A timeline or cue in the Action column of the Task window, performed when the task's start condition is satisfied. *See also* task, condition.

ADB port Apple Desktop Bus. Connector on Apple Macintosh and compatible computers for connecting an ADB mouse, keyboard, AIRLINK RECEIVER, etc.

address A two digit octal number in the range 10 through 77, used to identify a port on a control unit. *See also* port, control unit, octal.

arc suppression The process of preventing high voltage spikes from damaging electrical components, such as switches. Such high voltages are generated when the power to an inductive load, such as a relay or a motor, is cut off. The arc suppression is performed by an electrical component, such as a varistor, which short-circuits the high voltage spike. *See also* varistor.

ASCII American Standard Code for Information Interchange. The most common standard for representing the characters in the English alphabet plus numbers and punctuation marks in binary form, using seven bits of information. *See also* bit, byte.

autolocator A device capable of automatically locating an arbitrary position on a tape.

auxiliary relay An extra relay provided on a dissolve control unit for user-defined functions.

background page A page on a TOUCHLINK panel that's displayed as a background of other pages. *See also* page.

balanced signal A signal sent over two twisted wires where the polarity of the signal is inverted in one wire compared to the other. The receiver uses the differential voltage

between the wires to decode the signal. This results in a signal path that's less susceptible to noise. Examples of such signals are the RS422 and RS485 serial data standards. *See also* unbalanced signal, optically isolated.

baud rate — *See* data rate.

bit — Binary digit. The smallest possible unit of information. It can only take on two states, often represented by 0 and 1. *See also* byte.

boolean expression — *See* logical expression.

byte — A group of eight bits. Sometimes called an "octet". Often used to represent an ASCII character. Typically expressed using hexadecimal notation. *See also* bit, ASCII, hexadecimal.

CAV — Constant Angular Velocity. A format used for disks where the same amount of information is stored on each cylinder of the disc. When used with video discs, this usually means one full frame per revolution. *See also* CLV.

chase-lock — The process of synchronizing one device (the slave) to another device (the master). This is typically performed using an autolocator to position the slave according to timecode recorded on both devices, and then using vari-speed to fine tune the slave's position while playing to make it match the master's position. *See also* autolocator, timecode, vari-speed.

CLV — Constant Linear Velocity. A format used for disks where the density of information is the same all over the disk. Thus, to read information on the outer tracks at the same speed as on the inner tracks, the disk must rotate at a slower speed. This results in the ability to store more data on the disc. When used with video discs, this translates into 60 minutes per side versus 36 minutes for CAV disks (PAL). *See also* CAV.

condition An expression in the Condition column of the Task list which, together with the condition variant, specifies when the task's action is to be performed. This expression is evaluated as a mathematical formula. If the result is a non-zero value, the condition is considered to be true. *See also* task, expression, action, condition variant, true.

condition variant Information entered in the 1/0 column of the Task list that specifies whether the task should be started when the condition is or becomes true or false. *See also* task, expression, action, condition.

constant A value in an expression that never changes, such as the number 5. *See also* expression, variable.

control signal A data signal recorded onto an audio tape track that contains all information needed to run a presentation. This control signal track can be fed into the PLAY input of the first SMARTPAX or PAX control unit, which decodes it and forwards it to the rest of the system.

control unit A device, such as a SMARTPAX, PAX or TRANSPAX+, that can control presentation devices. *See also* dissolve control unit, device.

cue A package with instructions to be performed by one or many devices. Can be placed either in the Task list or along a timeline.

cue track *See* control signal.

data rate The speed at which data can be transferred from one place to another, usually expressed in bits or bytes per second. *See also* bit, byte, serial data.

DCE Data Communications Equipment. A device used to adapt a computer to a communications network, e.g. a modem. On such a device, a signal named TRANSMIT is an input to the device. *See also* DTE.

device A piece of equipment used to run a presentation, such as a laserdisc player or a slide projector. Icons representing the devices are kept in the Device window in TRAX. *See also* device icon, virtual device.

device assignment The process of assigning one or many devices to a cue by selecting the devices using the mouse while the cue is selected. Only devices that have been assigned to a cue in this way will be affected by that cue. *See also* device, cue.

device icon A symbol in the Device window in TRAX that represents a presentation device. *See also* device.

device information database A repository of information about each presentation device supported by TRAX. To see the information about a device, select the device in the Device Support window and click the Help/Info button.

device ownership The relationship between a device and the task that currently controls it. This can be seen in the title bar of the device's configuration dialog box. A device owned by a task can't be controlled by other tasks of equal or lower priority or by panel items. *See also* task, device, priority.

device-specific mode A function of a device that is specific for that particular make and model. For example, while all video disc players can play video, not all can switch between the internal video and an external video source; i.e., the video switching capability is a device specific mode. The device-specific modes supported by a device are displayed at the bottom of the status window for that device, and can be programmed using a Trigger cue. *See also* mode, state.

device status linking The process of forming a link between a device status property and a panel item, such as a button or a slider, or a task condition. This is done by clicking the device icon while the item or condition is selected, and choosing the status property on the pop-up menu. *See also* condition, item, device status property.

device status property — An attribute of a device which can be affected by cues and panel items, and can be used as a variable in task conditions. Some status properties are read-only, and can not be changed by cues or panel items. *See also* property, item, task, cue, device status linking.

dialog box — A window on the computer's monitor used to provide information in order to perform a command. *See also* modal window, non-modal window.

discrete-position device — A device that has a position that varies in discrete steps, such as the slide number in a slide projector. *See also* time-continuous device.

dissolve control unit — A control unit specifically designed to handle slide projectors, e.g. the PAX. *See also* control unit.

dithering — A process by which intermediate colors can be simulated by using multiple pixels with alternating colors. *See also* pixel.

DMX-512 — A digital serial data protocol for controlling dimmers and other lighting instruments. Standardized by USITT and supported by most lighting equipment manufacturers. *See also* serial data, RS485.

downloading — The process of transferring data, such as device drivers or graphics, from the computer to the control units and panel devices. Performed using the Download button in the Device Support window.

DTE — Data Terminal Equipment. A device that is an origin or destination of data (as compared to a DCE, which only forwards the data). On such a device, a signal named TRANSMIT is an output from the device. *See also* DCE.

DTR — Data Terminal Ready. A handshaking signal that's part of the RS-232C standard. *See also* handshaking.

EBU European Broadcasting Union. The European equivalent of SMPTE. Sometimes used as a generic name for the 25 fps timecode standard. *See also* timecode, fps, SMPTE.

evaluate The process of calculating the result of an expression, such as the starting condition of a task in the TRAX Task list. You can manually evaluate such expressions by selecting the expression and pressing Command-Enter.

expression A simple mathematical formula, giving a single result. *See also* condition, evaluate, sub-expression, logical expression.

false One of the two possible results of a logical expression. *See also* true, logical expression.

finder The part of the Mac OS that is used to move files and icons, start applications, etc. *See also* Mac OS.

fps Frames per second. Usually used to describe a video signal. Common frame rates are 25 (PAL) and 29.97 (NTSC) frames per second. *See also* timecode.

full duplex The ability to communicate in both directions at the same time. *See also* half duplex, RS232, RS422.

gang A set of devices that have been combined using a Gang cue in order to perform operations simultaneously on all the gang members.

ground loop An unwanted current path where current flows through the ground and a communication cable between two pieces of equipment. This can result in unreliable communication or damage to the equipment. *See also* optically isolated.

half duplex The ability to communicate in both directions but not at the same time. In this case, a protocol must be established that manages the direction of communication. *See also* full duplex, RS485.

handshaking The procedure by which a device can tell a control unit if it is ready to receive new commands.

hexadecimal A method of expressing all sixteen possible values of four bits using the numbers 0 through 9 plus the letters A through F. Such hexadecimal digits are often combined to form 8 or 16 bit quantities, consisting of two or four hexadecimal digits. *See also* bit, byte.

icon A small symbol representing a file, a device, etc., on the computer's monitor. *See also* device, finder.

intelligent device A device that has a built-in microprocessor and supports two way communication. *See also* device.

item, on panel An object on a page in a panel, such as a button, slider or picture.

LCD Liquid Crystal Display. The display technology used in TOUCHLINK.

linking *See* device status linking.

logical expression An expression that results in either of two values; true or false. In TRAX, a result that is zero is considered false; anything else is considered true. *See also* condition, expression, false, true.

LTC Longitudinal timecode. Timecode data that can be recorded onto an audio track of a tape or disc. *See also* timecode, VITC, EBU, SMPTE.

Mac OS The operating system used by Apple Macintosh computers and compatibles. *See also* finder.

MIDI Musical Instrument Digital Interface. A standard by which musical instruments and computers can communicate using serial data streams. It's optically isolated and unbalanced. *See also* serial data, optically isolated, unbalanced.

modal window A window on the computer's monitor that must be dismissed before you can proceed, usually by clicking an OK or Cancel button. *See also* dialog box, non-modal window.

mode An attribute of a device, such as its transport mode, which can have a state or value. When creating Serial drivers in TRAX, the commands sent to the device are grouped into independent modes with mutually exclusive states. *See also* device-specific mode, state.

mode-less window *See* non-modal window

modem port The communications port on the back of a Mac OS computer marked with a telephone handset. *See also* port, printer port.

multi-tasking A method by which a computer can perform several tasks seemingly at the same time. Implemented in TRAX by the Task window.

mutually exclusive A number of functions of which only one can be in effect at any one time.

non-modal window A window or dialog box that can be left on the screen while you continue working with other functions in the same program. E.g. a device status window in TRAX. *See also* modal window, dialog box.

non-volatile A technology by which information stored in the memory of a control unit or other device can be retained even while the device is switched off. *See also* RAM, ROM.

octal A number in the range 0 through 7, used to represent a group of three bits. *See also* bit, address, hexadecimal.

operator A symbol, such as +, / and <, used to combine constants and variables in expressions. *See also* expression, constant, variable.

optically isolated — A technology by which a data signal can be transferred a short distance using light. This is done to break up the electrical connection between pieces of equipment, such as two control units, in order to avoid noise and ground loop problems. *See also* ground loop, balanced signal, control unit.

page — A page is used on a panel to combine related items. Those items can be accessed by telling the panel to display that page. *See also* background page.

pixel — Picture element. The smallest part of an image displayed on a computer monitor. On a black-and-white monitor, each individual pixel can be either on or off. On a grayscale monitor, each pixel can also take on intermediate values. On a color monitor, each pixel can have its own color. The number of grayscale levels or colors that can be displayed by each pixel depends on its depth, which is sometimes expressed as the number of bits used to store the pixel in the computer's memory. *See also* bit, dithering.

port — A connector on a computer or control unit used to transfer data. *See also* modem port, printer port, control unit.

primary value field — The value field inside a cue which holds its most prominent value, e.g. the dissolve rate in a Dissolve cue or the position to be located by a Locate cue.

printer port — The communications port on the back of a Mac OS computer marked with a printer symbol. *See also* port, modem port.

priority — The ranking of a task. This is specified in the Priority column in the Task window. Determines which task will get precedence when two tasks try to use the same device. *See also* task, device.

property — An attribute of a device, cue or other object which can be changed by the use, such as its position, color, level or rate. *See also* status property.

RAM

Random Access Memory. The part of the computer's memory that holds transient data, such as application programs and the objects they manipulate. The RAM memory is usually cleared when the computer is switched off. *See also* ROM, non-volatile.

ROM

Read Only Memory. The permanent part of a computer's memory, typically containing parts of the computer's operating system or other information that never changes. This memory is retained when the computer is switched off. *See also* RAM, non-volatile.

FLASH memory

A memory technology, used in TOUCHLINK, that is non-volatile and semi-permanent. A specific procedure is required to alter the contents of a FLASH memory, which is significantly slower and more complicated than changing the contents of a RAM memory.

re-recording

The process of temporarily removing cues from a timeline and restoring them, one at a time, by pressing the space-bar while the timeline is running. This can be used to synchronize the cues with, for example, a soundtrack.

relational expression

A logical expression using the relational operators, such as < and ≥, resulting in a true or false value. Such expressions are used to compare variables to other variables or constants. *See also* logical expression, variable, constant.

RS-232C

An unbalanced, full duplex, serial data communication standard commonly used by intelligent devices, modems, etc. Suitable for shorter distances (up to a few meters). *See also* unbalanced signal, intelligent device, full duplex, serial data.

RS-422

A balanced, full duplex serial data communication standard used by some professional intelligent devices. Suitable for longer distances than RS-232C, but may still have problems with ground loops. *See also* balanced signal, intelligent device, full duplex, serial data, ground loop.

RS-485

A balanced, half duplex, serial data communication standard used by some professional intelligent devices. This is basically a half-duplex variant of the RS–422 standard. DMX-512 is a variant of RS-485, which improves upon the RS–485 standard by requiring each device to be isolated from the bus in order to avoid ground loops. *See also* DMX-512, half duplex, serial data, ground loop.

running the tasks list

Activating the full multi-tasking abilities of TRAX, causing it to evaluate all conditions in the task list and start eligible tasks. This is done by clicking the play symbol in the lower left corner of the Task window or by pressing Command-spacebar from within any non-modal TRAX window. *See also* evaluate, condition, task, multitasking.

runtime version

A limited version of TRAX which allows you to run a show but not make changes to it.

SCSI

Small Computer Systems Interface. A standardized way of connecting peripheral devices, such as hard disks and scanners, to a computer. Used on most Mac OS computers.

serial data

A method of transferring data by sending it one bit at a time, thereby reducing the number of wires needed for the communication. This method is used by most data communications standards, such as RS-232C and RS-485. An alternative method is to send multiple bits at the same time, using individual wires. That method is used for example by the SCSI standard and by the internal bus in a computer.

Simple Text

A simple text editor that's included with Mac OS. In addition to opening text files, it can also open pictures, such as those captured from the screen by pressing Command-Shift-3. *See also* Mac OS.

SMPTE Society of Motion Picture and Television Engineers – the North American equivalent of EBU. Sometimes used as a generic name for the timecode standard maintained by the organization. *See also* timecode, fps, EBU.

starting condition A logical expression in the Condition column of the Task window which, together with the condition variant, can cause the task's action to be started. *See also* logical expression, condition variant, task.

state A named setting of a mode. States in a mode are mutually exclusive. *See also* mode, device-specific mode, mutually exclusive.

status property *See* device status property.

stop track A track along a timeline containing cues at which the timeline will pause automatically. Used for speaker support presentations controlled with the down-arrow key on the keyboard or an AIRLINK remote control.

sub-address An additional address used to further qualify the physical counterpart of a TRAX device. This can be used to specify, for example, a pin-number on a DIGITAL SMARTLINK or a specific channel on a lighting dimmer controlled through a SMARTPAX port. The sub-address is separated from the main address digits by an apostrophe. *See also* address, port.

sub-expression A part of an expression that in itself forms a proper expression; e.g. the part `5 * 6` of the expression `5 * 6 + 9 / 2`.

symbol *See* operator.

system cable The black cable running between Dataton control units, going from the OUT connector of one unit to the IN connector on the next. This bus carries a full duplex, optically isolated, balanced serial data signal.

system run mode *See* running the task list.

task An entry in the Task window, consisting of the following parts: condition, condition variant, priority and action. *See also* condition, condition variant, priority, action, multi-tasking, running the task list.

time-continuous device A device that has a position that changes in linear relation to time, such as the current position of a video tape. *See also* discrete-position device.

timecode A method to mark the medium of a time-continuous device with equally spaced, increasing numbers. These numbers are often expressed in hours, minutes, seconds and frames, according to the SMPTE or EBU timecode standards. Alternatively, it can be a simple count, such as a frame number on a video disc. Using this data, it is usually possible to tell an intelligent device to locate an arbitrary position (e.g., a specific video frame), as well as to know exactly where the device is in order to synchronize, for example, a timeline to the device. *See also* SMPTE, EBU, time-continuous device.

timeline A kind of task action containing a sequence of cues. Each cue has a time position along the timeline, and sits on a track. By running the timeline, the cues are applied to their assigned devices, causing them to perform as programmed. A timeline can be synchronized to a device, to another timeline, or free running. A timeline can be paused or re-positioned. When re-positioned, it will calculate the correct status of its devices at the new position. *See also* cue, track, action, priority, device assignment.

track *1.* A horizontal part of a timeline along which you can place cues (*see also* timeline, cue). *2.* A separate audio channel on an audio or video tape.

true The other of the two possible results of a logical expression. *See also* false, logical expression.

unbalanced signal A signal sent over a single wire relative a common signal ground. This method is used by the RS-232C serial data standard. It is more susceptible to noise than a balanced signal, such as RS-422. *See also* balanced signal, RS-232C.

user bits Extra data bits included with timecode as defined in the SMPTE/EBU timecode standards. The purpose of these bits vary with the application. You can program these bits from TRAX by using a TAPE SMARTLINK.

variable A value in an expression that may change between evaluations. In TRAX, the status properties of the devices act as variables. This may be a status property of a real device, for which a physical counterpart exists in the system, or virtual device. *See also* expression, evaluate, constant, virtual device.

vari-speed The ability to gradually change the speed of a time-continuous device, for example in order to chase timecode coming from another device. *See also* time-continuous device, chase-lock.

varistor An electrical component with the ability to drastically change its own resistance when the voltage across it exceeds a certain threshold. Used to prevent the high-voltage spikes caused by inductive loads, such as relays and motors, which could otherwise result in arching and component damage. *See also* arch suppression.

virtual device A device in the TRAX Device window which doesn't have any physical counterpart in the system. Used as a variable, for example to keep track of statistics in order to use this in a task condition or for presentation on a panel. *See also* device, variable.

VITC Vertical Interval Timecode. A method by which timecode data can be included as part of the video signal by putting it in the vertical blanking intervals between video frames. *See also* timecode, LTC.

Index

Numerics
1/0 column in Task window 57
12V DC ADAPTOR 345
12V DC INJECTOR 345

A
AC PAX 340
acknowledge, in serial driver 304
action 409
ADB port 409
address, of device 118, 409
AIRLINK 10, 88, 231, 244, 346
    receiver 351
    speaker support applications 347
    transmitter 346
    use in fully interactive applications 348
    use with slide projectors 349
Alphasync 378, 385
ANALOG SMARTLKINK 334
animate 202
anonymous mode 294
arc suppression 328, 333, 409
Arion 378, 386
arithmetic symbols 98
ascend, dissolve cue option 195
ASCII 266, 409
Audio Disc device
    configuring 141
    status properties 140
AUDIO SMARTLINK 335
audio synchronization 220
autolocator 372, 388, 392, 409
automatic mode, downloading in 68
automatic start 114, 240
AUXILIARY CABLE 339
auxiliary relay 129, 206, 409
AVL 378, 386

B
background pages, of panels 159, 251, 409
backward compatible mode 16
balanced signal 409
bar graph 171
bar graph item, use with time device 153
bau drate 285
baud rate 274, 410
beginning-of-tape sensor 390
big endian 310
big notes 399
blend 194
block mode handshaking 304
boardroom 235
boolean operators 101
boost output, in level device 149
branching 261

bring to front 84
button 163
    action 161, 164
    colors 166
    icon 167
    kind 165
    linking to a numeric status property 161
    shape 166
    text 167
byte hi/lo 310

C

cable length, maximum between units 8
calendar functions 153
canned presentation 220
CAV disc format 146, 410
CD player 141
chapter numbers, on laserdiscs 144
chase-lock 410
choose button, in device 117
Clay Paky 336
clear command 81
clipboard 78
clock 153, 258
CLV disc format 146, 410
colors, of panels items 158
comments 218
computer port, selection in device 117
condition 411
conditional execution, of control cue 216
conditions 245
    editing 55
    evaluating the result of 59
    variants 57, 411
constant 411
constants
    using in conditions 58
contact closures 130, 242, 328
control cue 212
    finding by name 85
    jump to 213
    pause 214
    perform only if... 216
    run 214
    special names of 217
    stop 214
    synchronization offset 215
    syncronize to 214
    target timeline 212
control signal 16, 18, 225, 357, 373, 376, 384, 411
converting older TRAX shows 405
copy command 78
copying between shows 80
copyright notice, while opening a show 4, 114
countdown timer 153, 259
counter 259
crossfade 194
cue menu 95, 180

cue track 16, 18, 225, 373, 376, 411
cue types
control 212
dissolve 194
flash 202
gang 210
locate 186
note 218
set/fade 190
snap 204
trigger 206
wipe 200
zoom 198
cues 178, 411
adding to menu 180
adding to the menu 180
assigning to devices 40
black line below 107
creating 34, 95, 178
customizing 95, 180
deleting from menu 93
device assignment 183
distributing 89
duplicating 82
editing 178
editing in list view 49
editing specifications 40
expanding/compressing 90
general characteristics of 179
gray line below 107
grouping 91, 184
importing from other shows 76, 183
locking 92, 184
moving 37
moving using the keyboard 38
name of 179
primary value 181
primary value field 417
printing 50, 185
re-recording 43
saving in scrapbook 184
selecting 35
selecting in list view 48
storing on menu 95
synchronizing 43
time position of 182
track assignment 182
value substitution 181
customized cues 180
customized cues, importing 76
cut command 78

D
data rate 274, 285, 411
date 258
day 258
DC ADAPTOR 345
DC INJECTOR 345

decimal format, in Serial drivers 310
decrease by, button action 164
delay, in serial driver 276
delete from cue menu 93
descend, dissolve cue option 195
device assignment 412
device information database 65, 412
device menu 94
device ownership 412
device specific modes 139, 208
device status linking 412
device status properties 413
    linking to panel items 160
device status windows 14, 28
device status, at the beginning of a timeline 42
device support window 63
Device window 23
device window 14, 23
devices 412
    adding 23, 94
    address 400
    configuration dialog box 115
    conflicts 27
    creating multiple 24
    crossed icon 120
    disabling 93, 120
    double-clicking icons 109
    editing specifications 27
    gangs 28
    general characteristics of 115
    getting from other shows 25
    getting information on 65
    information database 116
    ownership of 121, 401
    port assignment 117
    printing 27
    resetting 209
    selecting and moving 24
    status of 93
    status property 420
    status window 119
    status windows 28
    storing in scrapbook 26
    time-continuous 186, 421
    type pop-up menu 116
    virtual 122, 252, 401, 422
device-specific mode 412
digital inputs 331
digital outputs 330
DIGITAL SMARTLINK 129, 328
dimmer 336
disable device 93
Disabled checkbox 120
discrete position device 186

display 172
frame 173
suppress fractions 173
text style 173
time value 173
title 172
with time device 153
displayed time format 189
dissolve 194
advanced options 196
automatic step 194
curves 197
rate of 194
sequence 195
using different lamp rates 196
with slide projector 126
distribute cues 89
dithering 250, 413
of TOUCHLINK pictures 175
DMX SMARTLINK 336
DMX-512 336, 413
downloading 413
automatic device selection 66
failure 320
in automatic mode 68
in manual mode 69
manual device selection 67
of panel designs 70
troubleshooting 69
drawing grid, in panel 150
duplicate command 81, 82
duty cycle, of flash effect 202

E

EBU 137, 337, 384, 414
edit menu 77
eject 139, 209
Ektagraphic slide projector 359
Electrosonic 378, 385
ellipsis, use in cue names 179
enable device 93
error message, in SMARTPAX 320
evaluating and expression 414
events 232
expand/compress cues 90
expression 414

F

fade cues 190
copying between shows 80
fade rate 191
fade stop cue
with slide projector 125, 128
fading stopped checkbox 126, 128
fax software, problems with 111
feedback 247, 256
file menu 73
film time format 137

find/replace 85
flash 202
    duty cycle of 202
    momentary 199
    sequencing 203
    stop 202
    use with Snap cue 203, 205
    with slide projector 125, 127
flash-fade 127
font size, in text device 151
forward 187
fps 414
fractional percentage values 193
frame item, on panel 174
freeze 128, 191
function keys 88, 217

G

gang cue 210
gangs 28, 110, 414
    maximum number of 211
graphics, on panel 249
grid, for panel items 150
ground loop 414
group command 91

H

handshaking 275, 287, 415
hard snap cue
    with slide projector 125
hard-disk, space required 2
hardware interface 272
Hasselblad PCP80 360
HEX encoding 267
hexadecimal 267, 308, 310, 415
hold level 191
home cue 209

I

import command 76
importing cues 183
importing older TRAX shows 405
increase by, button action 164
indicator 168
    invisible 169
    sound 169
    title 169
    with time device 153
infrared remote control 338, 346
inputs 242
installing TRAX 3
intelligent device 415
interactive mode 18
interactive presentations 234, 241
interactivity 261

invisible, button kind 165
IR SMARTLINK 338
items, on panel 415

J
jumping
    to a Control cue 217
    to a cue 227
    to a timeline position 213

K
Kodak PDC 378, 386
Kodak slide projectors 359

L
lamp curves 197
lamp device
    configuring 148
    status of 148
laserdisc formats 146
level device
    boosting output level of 149
    configuring 149
    initial level value 149
    status of 149
level, setting or fading to 193
lighting 336
lighting console 192
line item, on panel 174
linking 415
    conditions to device status 54
    device status properties 160
    panel items 254
list view, of timeline 46, 106
little endian 310
live editing 193
live events 232
locate 186
    by number 187
    by time 187
    displayed time format 189
    frame number 187
    next 187
    out time 188
    previous 187
    turn level off 189
    with tape device 135, 136
    with time device 153
locating a position of a device 186
locator adaptor 392
lock command 92
logical symbols 101
logo, displaying while loading a show 4
loops 213, 229
LTC 415

M
Mac OS, version required 2
MAC SMARTLINK 337
manual mode, downloading in 69
Mate-Trac 378, 386
meeting room 235
melt 191
menu
    cue 95
    device 94
    edit 77
    file 73
    object 89
    symbol 96
    window 102
menu tree 261
MIDI 244, 415
MIDI SMARTLINK 327
minidisc 141
mixer 335
mixing console 192
modem port 2, 111, 416
modes 293, 416
momentary, button action 164
month 258
motion sensor, in TOUCHLINK 165
multiple faders 192
multi-tasking 241
mutually exclusive switches 130

N
new show command 73
new timeline command 102
news, in TRAX version 3 394
next position 187
normal, button kind 165
note cue 218
    with text device 151
note window 218, 398, 399
NTSC frames 138
numeric position 187
numeric values, in serial drivers 270, 309

O
object menu 89
offset relative sync source 106, 215
open show command 74
operator prompting 233
operator, in expression 416
optically isolated 417
out time, of locate cue 188
oval item, on panel 174

P
pages, of panel device 157, 251, 417
PAL frames 138
panel
  background pages 159
  configuring 150
  design of 156
  downloading 177
  pages 157
  sound 109, 169
  status of 150
  status window 156
  testing 177
  tool bar 156
  window 14
panel items 171
  button 163, 246
  colors 158
  display 172
  drawing new 157
  editing 157
  fame 174
  graphics 249
  indicator 168
  kinds of 158
  line 174
  linking to device status properties 160, 254
  oval 174
  overlapping 158
  passive vs. active 158
  picture 175
  priority of 162
  slider 170, 246
  static text 174
  status indication by 162
  text 174
parity 274, 286
password 4, 113
paste command 79
pause 207
PAX 11
  auxiliary relays 367
  BANK selector 361
  disabling 361
  front panel 356
  IN connector 356
  LINE-UP button 362
  manual reset 362
  OBJECT selector 359
  OUT/RMT connector 357
  port wiring diagram 363
  power supply 365, 368
  projector adaptors 366
  read panel 363
  switch functions 132, 367
  TAPE connector 357
  TAPE/DATA OK indicator 359
personalizing TRAX 4

picture item
color fidelity of 175
options 176
picture, displayed while opening a show 112
picture, on panel 175
play 207
PMX SMARTLINK 336
port 417
port field, in device 117
Positrak 386
power supply 345
precedence of symbols 97
preferences command 108
pre-programmed presentation 220
presentation software, controlling 337
presentations
canned 220
interactive 234, 241
live 232
speaker support 226
staging 238
previous position 187
primary value 417
primary value field 181
printer port 2, 111, 417
printing 27
printing cues 50
priority 417
panel items 162
tasks 52
priority of task 52
Procall 378, 386
projector 194
projector. *See* Slide projector
prompting 233
property 417
protocol, of a device 298
Pulsar 336

Q
quickfind 88
quit command 76

R
rack adaptors 341
RAM memory, required to run TRAX 2
rate of fading 191
recording 136, 208
recording a cue track 225
redo command 77
relational expression 418
relational symbols 100
RELAY SMARTLINK 333
relays 129, 206, 328
remote control 231, 244, 338, 346
repeat loops 229

replace command 85
re-recording 418
resetting a device 209
reverse 187
rewind 207
ripple-dissolve 127
RS232 cables 272
RS232 SMARTLINK 327
RS-232C standard 418
RS422 SMARTLINK 327
RS-422 standard 418
RS-485 standard 419
running a timeline 214
running the task list 60
running the tasks list 419
runtime version of TRAX 3, 5, 419

S

save command 75
scrapbook 80, 184
screen area, for slide projector 124
security options 113
select all 83
select to end 83
send to back 84
sensors 243
sequencing slide projectors 124, 195
sequential animation 203
serial data 419
serial device
    configuring 154
    status of 154
serial driver 264
serial drivers
    acknowledge 304, 310
    anonymous mode 294
    block mode handshaking 304
    break 308
    commands 269
    commands in 292, 298
    communication parameters 274
    creating new 280
    creator 284
    data bits 291
    data rate 285
    default state of mode 297
    delay 276, 290
    delay in 309
    downloading 311
    editing existing 278
    field width 311
    handshaking 287
    hex data 308
    modes 269, 293
    numeric value 309
    numeric value formats 310
    numeric values 270, 302, 306
    parity 286

settings 282
states 293
stop bits 291
trigger cues 313
using 312
value 309
value formats 310
value, changing in status window 315
value, limiting range of 311
value, specifying in trigger cue 314
version 284
serial number, of TRAX 4
serial port 2, 111
set to, button action 164
set/fade 190
level 193
live edit 193
multiple faders 192
rate of 191
single fader 192
start a fading 191
stop and resume 191
with audio disc device 142
with lamp device 148
with slide projector 126
with Video Disc device 145
show
creating new 73
opening 74
saving 75
starting automatically 114
show device status 93
show slide numbers 110
shuttle slider 138
side buttons, of TOUCHLINK 165
slide projector 123, 194
busy 125
cycle time 125
flashing 125
preferences for 110
remote control of 349
sequencing 124
status indication 125
status properties 128
slider item, on panel 170

smartlinks
analog 334
audio 335
digital 328
DMX 336
extending 326
IR 338
mac 337
making your own 339
MIDI 327
PMX 336
relay 333
RS232 327
RS422 327
serial 327
system in/out 338
tape 337
SMARTPAX 9, 316
ADDR button 321
DEVICE button 322
device drivers available 323
display 320
download failure 320
drivers, creating new 71
front panel 317
IN connector 317
OUT connector 317
PORT button 321
port wiring diagram 324
power supply 325, 329, 340
rear panel 324
TAPE connector 318
TAPE/DATA ON indicator 319
version of system software 320
wiring 324
SMARTPAX drivers window 398
SMPTE 137, 337, 384, 420
snap 204
close 205
open 205
sequence 205
use with Flash cue 203, 205
sound synchronization 220
sound, in panel indicator 169
speaker support 226, 347, 420
specifications command 83
staging a presentation 238
standard step delay, for slide projector 110
standard time format 137
starting automatically 108, 114, 240
starting condition, of task 53, 420
state, of mode 293, 420
static text items 174
status property, of device 420
status *see "device status"*
step delay 196

Still Store device
configuring 147
first position of 147
status properties 147
stop 207
stop track 105, 420
stopping a fading 128, 191
stopping a flash effect 202
sub-address, of device 118, 420
sub-expression 101, 420
switch 206
switch closures 242, 328
Switch device
configuring 129
input 130
mutually exclusive in group 130
output 130
status of 131
status properties 132
virtual 129
symbol menu 96
symbols 420
arithmetic 98
logical 101
precedence of 97
relational 100
synchronization 220, 337
offset 215
synchronizing a timeline to a device 42, 214
synchronizing cues 43
system cable 8, 420
System cue 405
SYSTEM IN/OUT SMARTLINK 338
system modes 16, 112

T

tab key, in timeline window 31, 104
tape control window 397, 402
Tape device
configuring 133
recording 136
status of 135
status properties 140
tape remote cable 392
tape signals 373
TAPE SMARTLINK 337
task 421
Task window 15

tasks
adding 51
copying between shows 52
deleting 52
editing action of 51
ID number of 62, 121
moving 52
priority 52
priority vs. panel items 162
running 60, 419
selecting 52
starting 420
starting automatically 58
starting condition 53
text 218
text device
putting text into 151
status of 151
text items, on panels 174
time arithmetic 98
Time device
configuring 152
displaying on panels 153
status of 152
time format for 152
time device
setting 153
starting/stopping 153
time format
in locate cue 189
in time device 152
time of day functions 153, 258
time scale, of timeline 107
time, displaying on panels 153
timecode 223, 337, 374, 375, 384, 421
timecode signal 373
time-continuous devices 186, 421
timeline 421
creating 29
current time position of 30
device status 42
end of 104
grey time readout 41
jumping to time position 103
opening window 29
running 41
scrolling while running 105
setting the length of 31
slaving to another 106
start time 104
stopping automatically 105
stopping vs. pausing 42
synchronizing 214
synchronizing to a device 42
tab key 31
time scale 39, 107
window 15, 29

timeline settings command 103
timelines
control cue 212
creating 102
jumping to a time position 213
news in TRAX version 3 396
pausing 214
priority 52
settings 103
starting 214
starting from other timeline 228
stopping 214
synchronizing to a device 223
timers 153, 259
toggle, button action 164
touch panel 246, 342
TOUCHLINK 10, 246
buttons on side 165
cable, extending 345
color fidelity of pictures 175
contrast, adjusting 343
Graphics Sampler 3
motion sensor 165
mounting accessories 344
power supply 344
sound 169
specifications 343
wall mount kit 344
tracks 421
in timeline window 32
locking 33, 105
renaming 32
TRANSPAX+ 11
autolocator 372
CODE selector 384
connecting 133, 369
control signal 376
front panel 379
HOME button 387
IN connector 379
MODE selector 382
OUT connector 379
PLAY connector 380, 391
power supply 388, 393
rear panel 388
RECORD connector 391
remote control 392
signal types 373
system modes 369
tape adaptors 392
TAPE CONTROL connector 388
TAPE CONTROL output 392
TAPE OK indicator 382
timecode 374, 375
translating control signals 378
transport functions 207
TRAX cable 6

TRAX runtime version 419
TRAX_TMP_xx file 75
tray advance 194
tray advance delay, overriding 196
trigger 206
    device specific mode 139, 208
    eject 139, 209
    off 206
    on 206
    output control 207
    play 207
    pulse 206
    record mode 208
    reset (home) 209
    serial driver 313
    switch 206
    toggle 206
    transport 207
    with serial device 154
    with tape device 135
    with video disc device 143, 145
turn-key installation 114
twinkle 202
type pop-up menu, in device 116

U

undo command 77
ungroup command 91
unlock command 92
upgrading, from TRAX version 2 4, 394
user bits, in timecode 337, 422

V

value field, in Serial device 154
value substitution in cues 181
value, for device specific mode 139
Video Disc device
    chapter 144
    configuring 143
    disc formats 146
    playback speed 143
    position of 144
    status properties 140
    video output 145
video disc device
    playing backwards 143
virtual devices 122, 252, 422
virtual Switch device 129
volume control 335
volume, of audio disc device 142

W
weekday 258
window menu 102
windows
    closing 73
    moving and resizing 22
    note 398, 399
    opening and closing 20, 102
    tape control 397, 402
wipe 200
    direction of 201
    lamp rates 201
    with slide projector 126
wireless remote control 346

Z
zoom 198
    lamp rates 199
    sequencing of 199
    with slide projectors 126